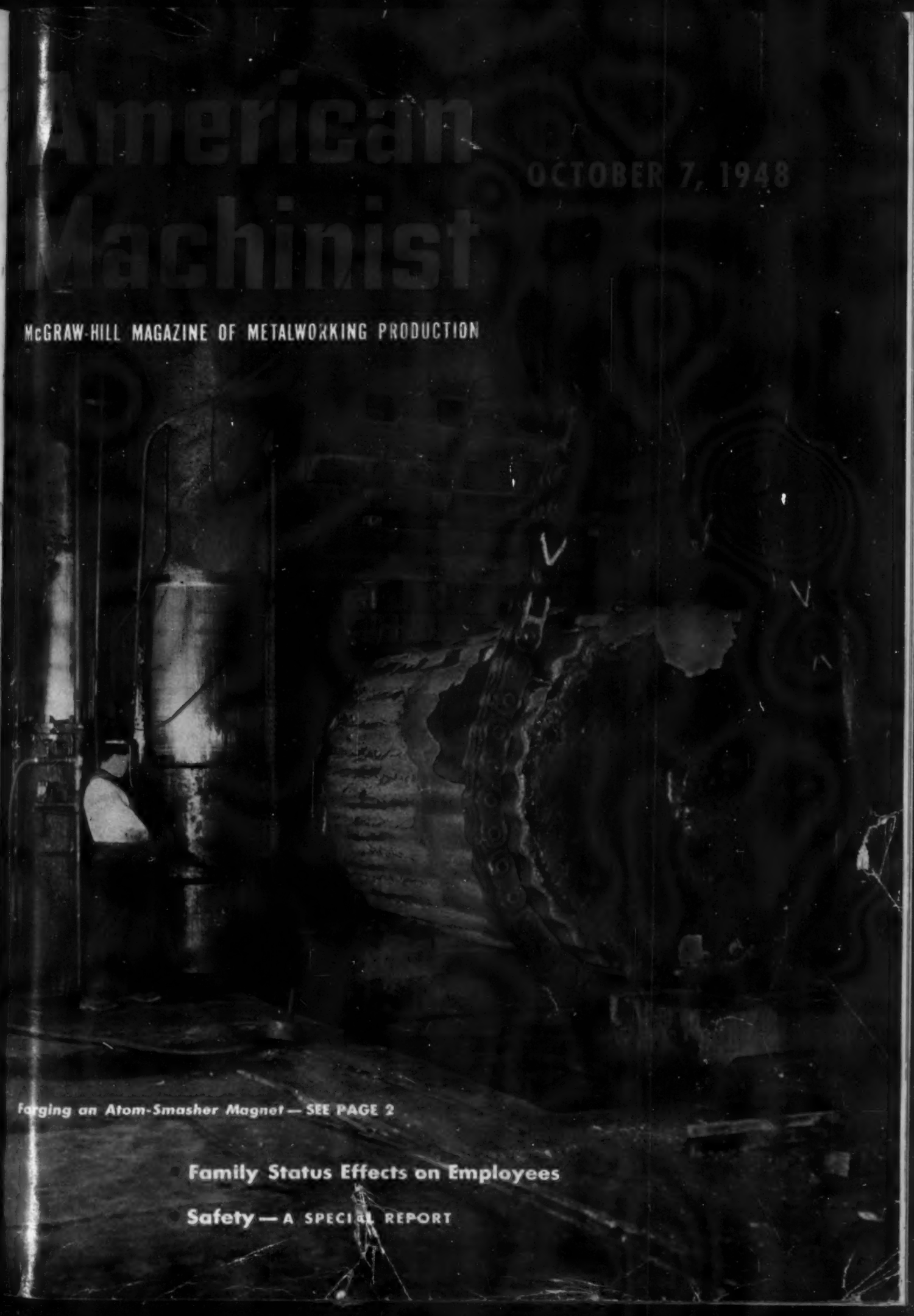
American Machinist

OCTOBER 7, 1948

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Forging an Atom-Smasher Magnet — SEE PAGE 2

Family Status Effects on Employees

Safety — A SPECIAL REPORT

The NEW HEALD RED HEADS are

LUBRICATED FOR LIFE

...and they run 50% cooler!

With the NEW Heald Red Head boringheads and wheelheads you don't have to worry about lubrication. No greasing — no oiling. The *right* amount of the *right* lubricant is inclosed — for life! This means less maintenance, no breakdowns due to improper lubrication.

The new Red Heads are designed to operate at much lower temperatures, too — 50% cooler than oil-lubricated heads. They prevent heat distortion, maintain higher accuracy, give a smoother finish.

Spindles are extra-rigid — precision ground all over to run absolutely true. Super-precision bearings protected by labyrinth seals assure longer smooth-running operation.

Designed specifically for the new Heald Bore-Matics and Internal Grinding Machines, these heads make possible the highest standards of accuracy and finish, with longer life and less maintenance. We'd like to tell you more about these new, better heads and what they can do for you. Your nearest Heald representative or Worcester will gladly give you the complete story.

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Chips and QUIPS

Our Cover . . . Possibly the finest color picture of a forging operation we have ever seen, this Ektachrome shows a 7000-ton forging press putting the squeeze on a tremendous steel ingot which will become part of the framework for the nation's most powerful atom smasher. Carnegie Institute of Technology, the U.S. Office of Naval Research, the Atomic Energy Commission, Buhl Foundation and Westinghouse are building the synchrocyclotron near Pittsburgh. Carnegie-Illniois Steel Corporation, U.S. Steel subsidiary, is making parts for the 400,000,000-volt electromagnet.

Work Safely . . . Safety is one of the most important, yet most-frequently disregarded, subjects in Metalworking. Last year, 17,000 people were killed, over 2 million injured, in industry, at a cost of more than $2.5 billion in lost time and compensation. That's a measure of importance . . . In our current special report, Associate Editor Ashburn shows types of safety equipment and their applications, with an over-all running comment on safety principles that you can apply in your plant. Reprints will, as usual, be available.

Quick Tips . . . Tool engineers will be interested as usual, in A. H. Waychoff's Short Cuts. . . . Then too, Chester Ricker describes how Buick machines forged brake bands for the Dynaflow, and Henry Gillis, supt. of the Radio Plant of Stewart-Warner, tells how a merry-go-round aids soldering of his company's radio-chassis assembly. . . . And don't miss the Naval Gun planer tooling!

Home? . . . Dr. Kinsey can broaden the sphere of his researches to good advantage, if a recent survey by Lockheed means anything. It at last provides statistical support for the opinion of many shop executives that a happily married man is the best and safest workman. This study, of 650 workers at Lockheed, shows much higher morale and lower absenteeism among married men after the age of 30 or so. The details are presented in our lead article, the authors are pictured below.

Versatile Dieheads . . . C. Reimschissel, chief development engineer for Landis Machine Company, has applied dieheads to many other than the conventional threading jobs. Here he tells how they can be used effectively in turning, forming and grooving.

Coming . . . Oct. 21 *A.M.* will contain a 16-page special report on the Automation Dept. at Ford—a group of engineers and mechanics with the special assignment of preparing new equipment for most efficient use. In the past three years, this department, not previously mentioned in print, has kept 50 people busy developing automatic devices to manipulate work and handle scrap on presses, welders, etc. . . . In that issue also will be a description of unusual production methods in making the Buick Dynaflow transmission.

Other features include descriptions of how to nitride stainless and machine copper alloys, a picture story of tricky operations in making a Kodak, hints on use of carbon blocks in welding, and an exposition of the importance of a sound maintenance schedule in lubricating machine tools, by the assistant works manager at Bullard.

LEE O. STOCKFORD

INDUSTRIAL PSYCHOLOGIST . . . Lee O. Stockford was graduated from the University of Southern California with his major field of study in psychology. For three years he was research assistant and teaching fellow at U.S.C. Then he had several years in the construction business before entering industry. More than seven years at Lockheed in industrial relations; the last five years of which have been in the field of research in industrial relations and industrial psychology. Past few years as part-time instructor of industrial psychology at U.S.C., and Industrial Testing at Occidental College, summer sessions. Previous publications in the field of psychology and industrial relations.

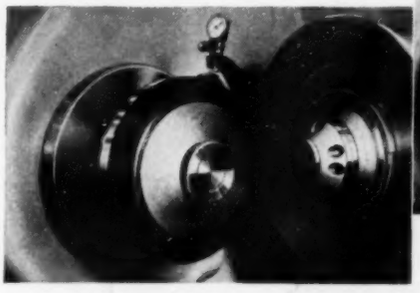
KARL KUNZE

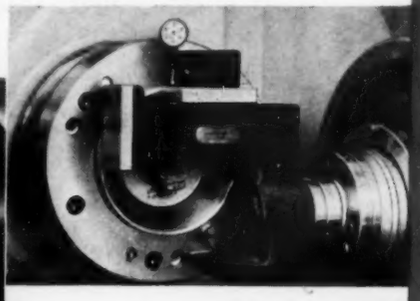
EMPLOYMENT MANAGER . . . Karl Kunze has his B.S. in B.A. and A.M. from Boston University and Harvard Graduate School of Arts and Sciences. He was formerly instructor of psychology at B.U. and Stevens Institute of Technology in applied psychology. For two years, industrial relations research assistant for the Psychological Corporation, New York City, during which time he developed tests and employment methods for private industry. For last seven years, he has had various assignments in industrial relations at Lockheed, and is presently employment manager. Co-authored our current article on morale; previous publications in psychology and industrial relations.

GLEASON WORK HOLDING EQUIPMENT FOR GLEASON MACHINES

CHUCKS
ARBORS
SET-UP GAGES
QUENCHING DIES

Designed for rigidity, concentricity, accuracy of size, with ample uniform force provided for holding the gear properly, ease of chucking and dechucking the gear.





Advantages of obtaining work holding equipment from the manufacturer of the machine itself:

KNOW HOW—full knowledge of machinery capacities and design features make it possible for us to design the most adequate work holding equipment for any given bevel gear job.

PROPER EQUIPMENT—to produce the highest quality of tooling much of the equipment used is of necessity special. This includes machining equipment as well as special gages and other inspection equipment.

UNDIVIDED RESPONSIBILITY—when work holding equipment and machines are ordered from us we alone are responsible.

RELIABILITY—when ordering work holding equipment for existing machines, the tooling is properly designed to fit the particular machine for which it is ordered, wherever located.

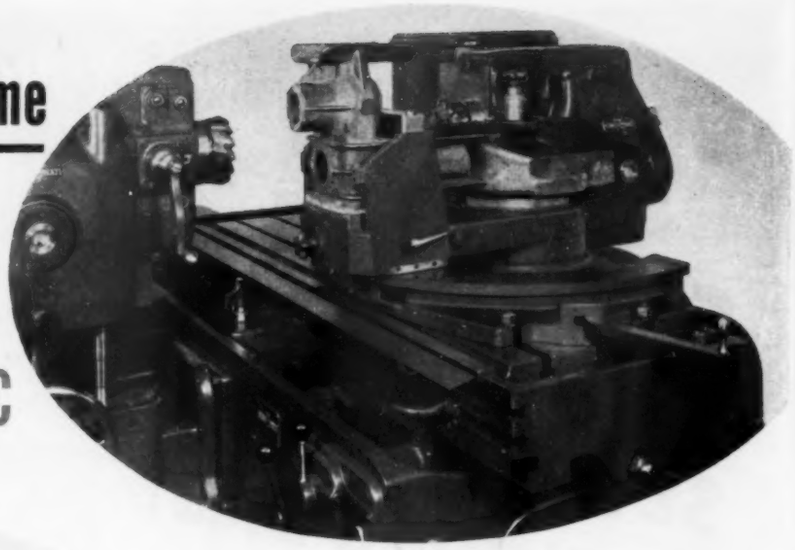
Write for your copy of Gleason Work Holding Equipment today for further information.

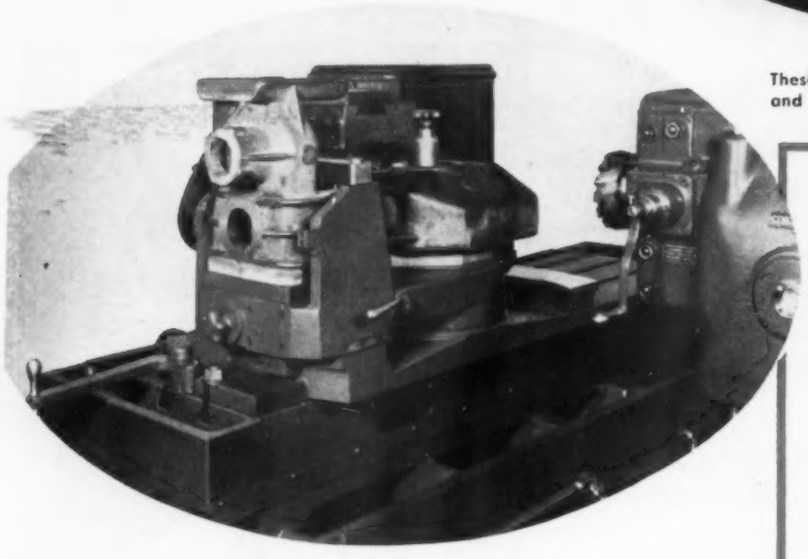
Builders of Bevel Gear Machinery for Over Eighty Years

Set-up + Handling Time

2

ON THIS DUPLEX HYDROMATIC





These two illustrations show the position of work and index fixture for two trips past the cutters.

One fixture devised by Cincinnati Application Engineers does the work of two in milling four surfaces of irregularly shaped gear housings; cuts set-up and handling time in half. The fixture has three index positions. Mounted on the standard CINCINNATI No. 35-48 Duplex Hydromatic Milling Machine illustrated in the two oval-shaped photos, the fixture does the job in three trips past the cutters. (See explanatory drawings at the right.) With sintered carbide face mills and a feed cycle which cuts in both directions of table traverse, an excellent finish is produced at low cost. ¶ CINCINNATI Hydromatics offer several advantages for work of this type: Automatic table feed cycles, one-way or two-way feed. Seven ranges of spindle speeds with plenty of power for high speed steel and sintered carbide cutters. Standard and complementary units to provide special machine features at low cost. ¶ For complete information write for catalog M-1372-1.

Drawing of part and sequence of feed cycles for milling four surfaces in one setting. Color lines indicate milled surfaces.

Part name
Gear housing

Material
Cast iron

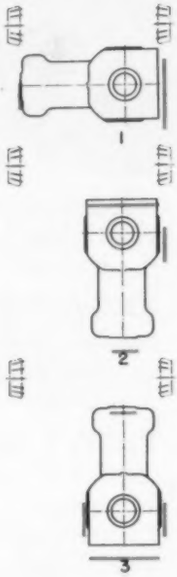
Operation
Mill four surfaces

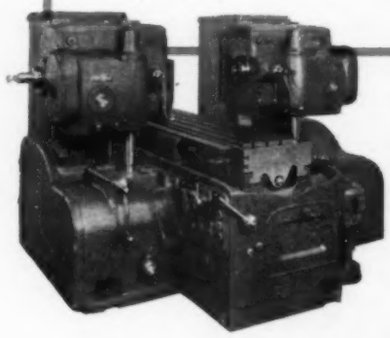
Depth of cut
3/16"

Feed
16" per minute

Cutting speed
223 feet per minute

Production
5 per hour





CINCINNATI Hydromatic Milling Machines are built in plain (simplex) and duplex styles; 18 sizes of each. Complete specifications may be obtained by writing for catalog M-1372-1.

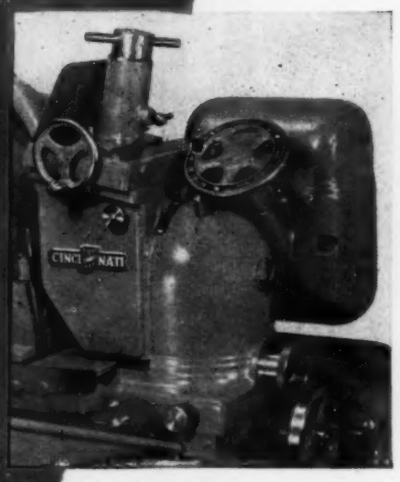
CINCINNATI

THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

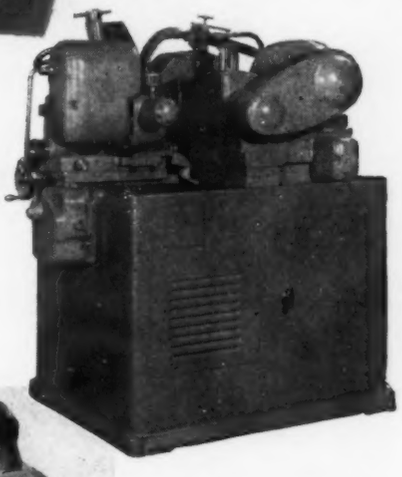
these parts precision ground on CINCINNATI FILMATIC NO. 0 CENTERLESS



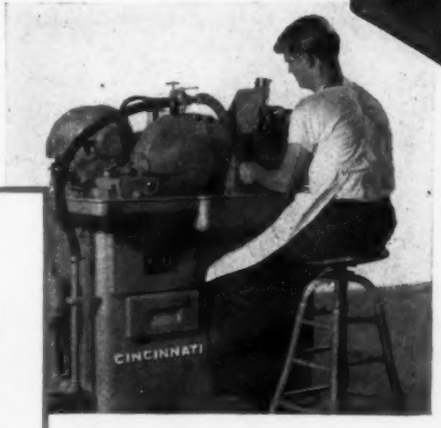
Regulating wheel unit . . . no gears to change; no levers to shift. Just rotate the hand-wheel to the speed desired.

From left to right the above parts are: Shaft; balance staff; No. 55 drill; synthetic ruby; spring; dentists' drill; stud.

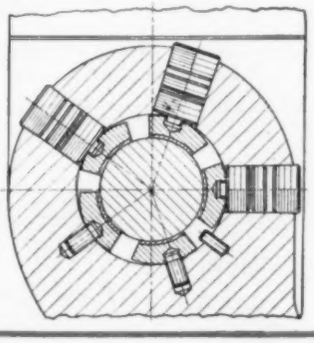
● One way to push down the cost of small parts is to make them on machines which are not overpowered nor too large. Look at the parts illustrated above. All of them were precision ground on a machine designed for this type of work—CINCINNATI FILMATIC No. 0 Centerless. Powered at the grinding wheel by a 2 hp motor, these machines have a capacity of 0 to ½" diameter by 4" (thrufeed) or 5" (infeed) length. Three features are illustrated at the right. Would you like to know more about CINCINNATI FILMATIC No. 0 Centerless? Ask for catalog G-576.



Rear view reveals smooth trim lines; built-in electrical equipment; floor space only 16 sq. ft.



They're built for operators who like to work while seated.



Cross section through FILMATIC grinding wheel spindle bearings . . . the most valuable feature you can obtain in a grinding machine.

FILMATIC

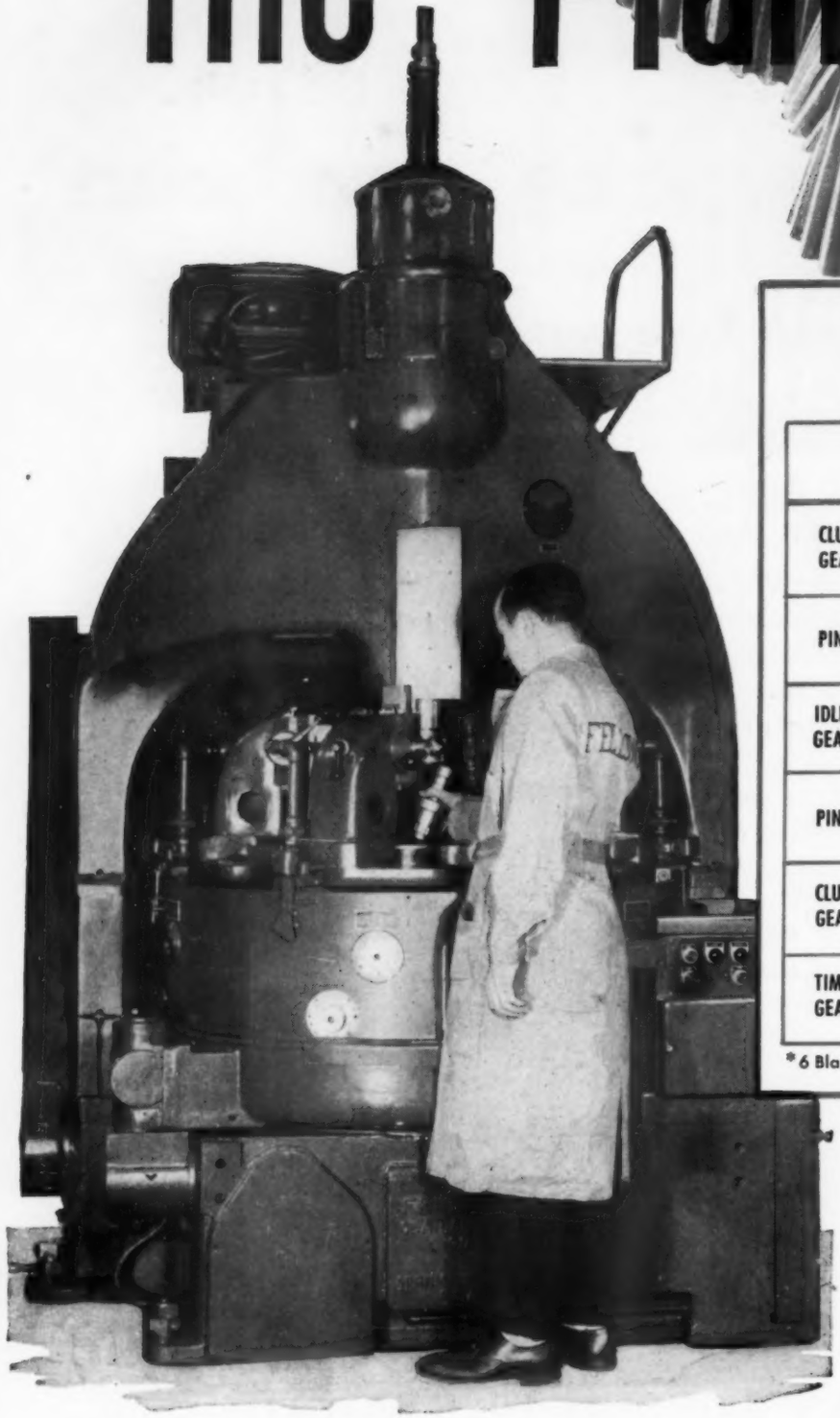
CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

CENTER TYPE GRINDING MACHINES • CENTERLESS LAPPING MACHINES • CENTERLESS GRINDING MACHINES

The Planetary



RECORD PRODUCTION on a wide

	MATERIAL	FACE WIDTH	PITCH	PITCH DIAM.
CLUSTER GEAR	FORGED STEEL	.687" .656"	7.5 7.5	3.200" 3.733"
PINION	SAE 4620	1.187"	16	1.818"
IDLER GEAR	SAE 5150	.750"	10/12	1.900"
PINION	SAE 1045	.238"	16	1.562"
CLUSTER GEAR	FORGED STEEL	.500" .400"	16 16	3.375" 2.875"
TIMING GEAR	SAE 1045	.238"	16	3.125"

*6 Blanks on arbor **8 Blanks on arbor

PIECES

GEAR SHAPERS • THREAD GENERATORS • CUTTERS • SHAVING AND BURNISHING MACHINES

...TAILORED TO THE JOB for SPEED beyond anything known before

CAPACITY
variety of gears

NO. OF TEETH	TYPE	PIECES PER HOUR
24 28	SPUR SPUR	128 128
28	HEL.	120
19	SPUR	128
25	SPUR	250*
54 46	SPUR SPUR	143 179
50	SPUR	334**

PER HOUR

• On Continuous Production Runs

Investment cost and production-rate advantages may well make The Planetary the most profitable gear cutting machine you can buy. The table opposite tells its own story. Here you have a machine of massive power, for heavy feeds, and high speed cutting as the work planets around the giant reciprocating cutter.

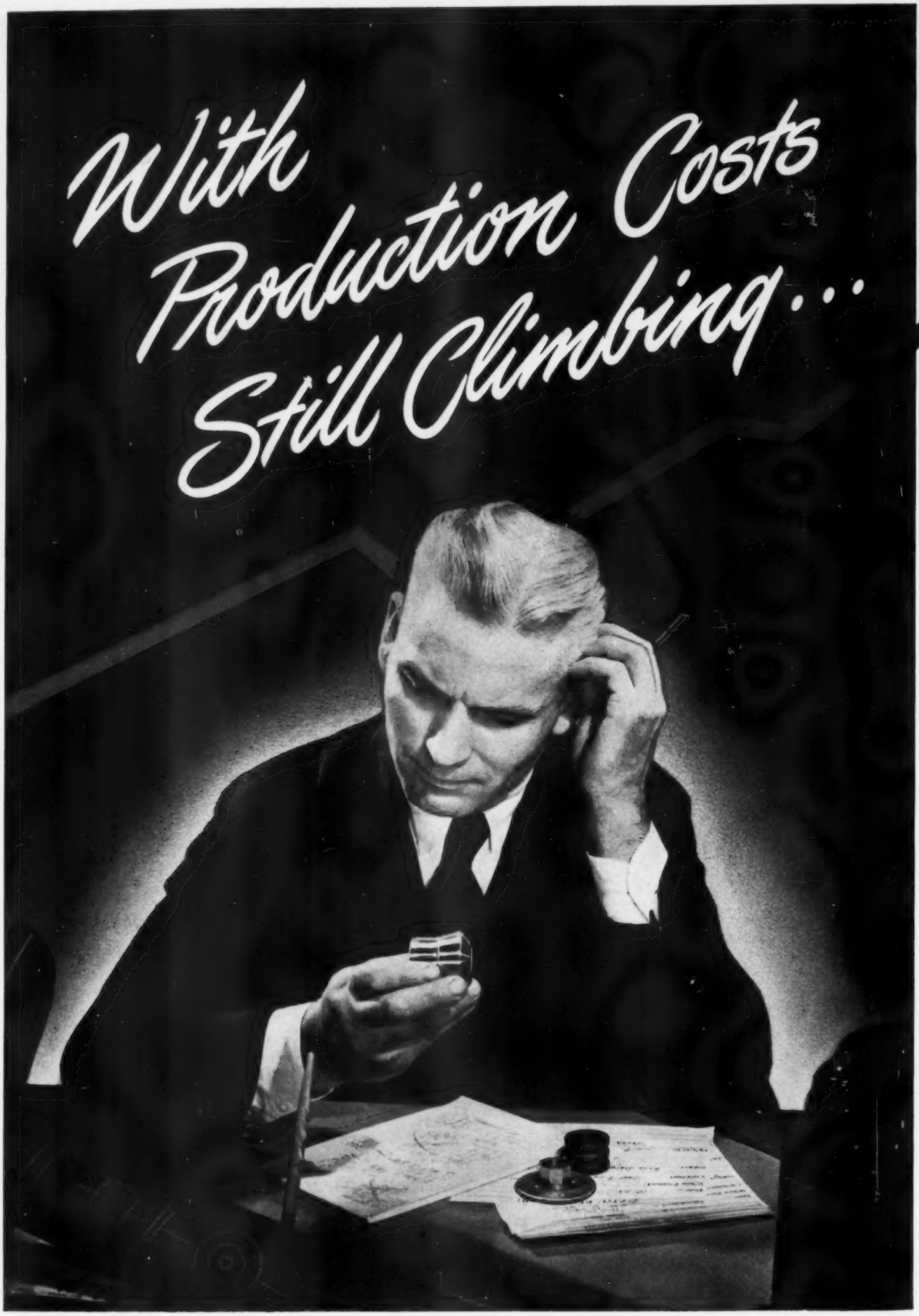
• High Accuracy Always

You expect it of every machine bearing the Fellows name. The Planetary is no exception. The progressive cutting by successive groups of teeth around the big-diameter cutter, produces an exceptionally fine finish, as well as involute accuracy. Write, or call on the office nearest you.

Fellows

THE FELLOWS GEAR SHAPER COMPANY
Head Office and Export Dept., Springfield, Vermont. Branch Offices: 616 Fisher Bldg., Detroit 2. 640 West Town Office Bldg., Chicago 12. 7706 Empire State Bldg., New York 1.

GEAR MEASURING AND INSPECTION INSTRUMENTS • PLASTICS MOLDING MACHINES


With Production Costs Still Climbing...

YOU NEED THIS IMPROVED

MACHINABILITY

In spite of the steady rise of fixed costs in the manufacture of steel parts, there still is one way in which you may strengthen weakening profit margins . . . through the *improved* MACHINABILITY of Republic Cold Drawn Steels.

This top MACHINABILITY—achieved without sacrifice of surface quality, physicals, soundness, tolerance or response to heat treatment—may be just what you need to raise production efficiency, step up output, cut unit costs and improve quality. It may permit higher speeds and feeds. It may reduce tool wear. It may make possible a smoother, brighter machined surface.

For 59 years, Union Drawn metallurgists and engineers have studied the machining characteristics of various steels. By cutting up tons of steel in laboratories and by observing performance in customers' plants under actual operation conditions, they have been able repeatedly to improve the MACHINABILITY of Republic Union Cold Drawn Steels. Furthermore, they have acquired unequalled machinery knowledge and experience which is yours for the asking.

Why not take advantage NOW of this cost-cutting combination of MACHINABILITY and machining assistance to help head off climbing production cost curves? A Union Drawn metallurgist is ready to talk to you.

REPUBLIC STEEL CORPORATION
Union Drawn Steel Division • Massillon, Ohio
GENERAL OFFICES • • • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

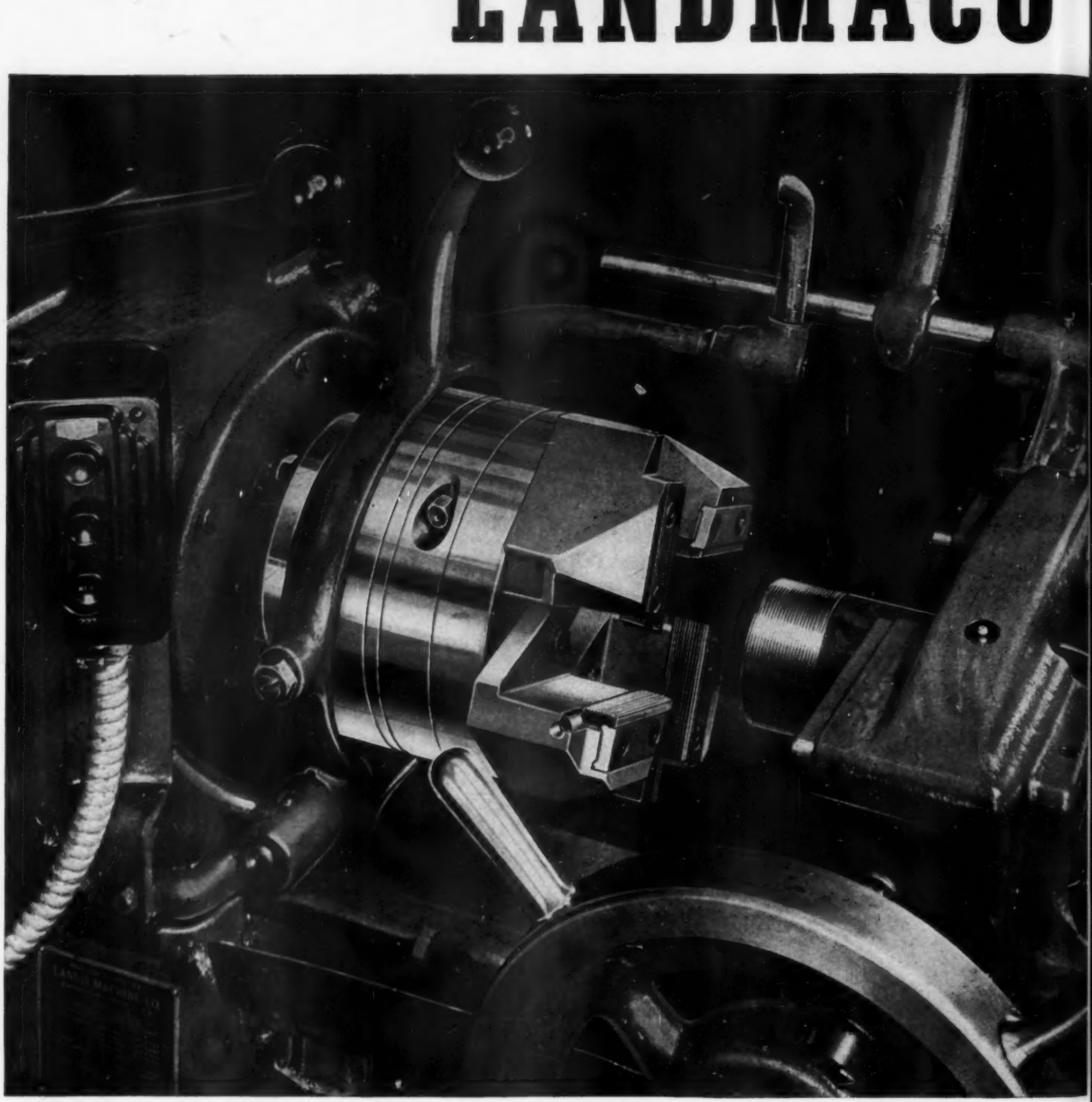
Republic

REPUBLIC STEEL
REG. U.S. PAT. OFF.

UNION COLD DRAWN STEELS

Free-Machining Bessemer, Alloy and Enduro Stainless Steels
•
Union Cold Drawn Special Sections
•
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting)

LANDMACO



The 1½" LANDMACO Single Head Leadscrew Threading Machine illustrated has a standard capacity of ⅜" to 1½". However, machine is equipped with 1½" LANCO Die Head fitted with oversize chaser holders for producing 3½" diameter 12 pitch threads on pump stators.

LANDIS TRADE-MARK REG. U.S. PAT. OFF.

LANDIS

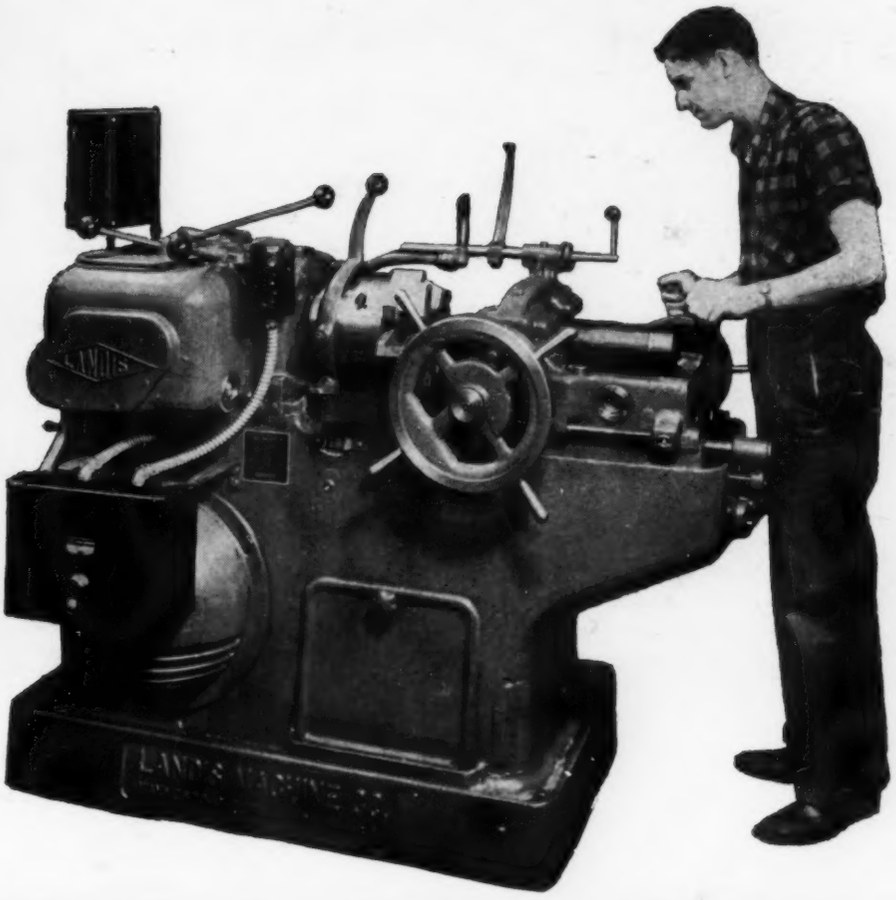
THREADING MACHINES

For Speed, Accuracy and Economy on a Wide Variety of Threading Jobs

Nine outstanding features—eight speed selective type gear box, vertical and horizontal adjusted carriage front; leadscrew attachments; anti-friction bearings on which gear shafts, leadscrews and spindles operate; wipers for bed guides; rack and pinion operated carriage; silent chain drive; and semi-steel bed cast in one piece with transverse bracing members; as well as double wall support for machine guides.

LANDMACO Threading Machines are built in 1" and 1½" Single, Double and Quadruple models as well as 2" and 2½" Single and Double models.

Send for Bulletin H-75



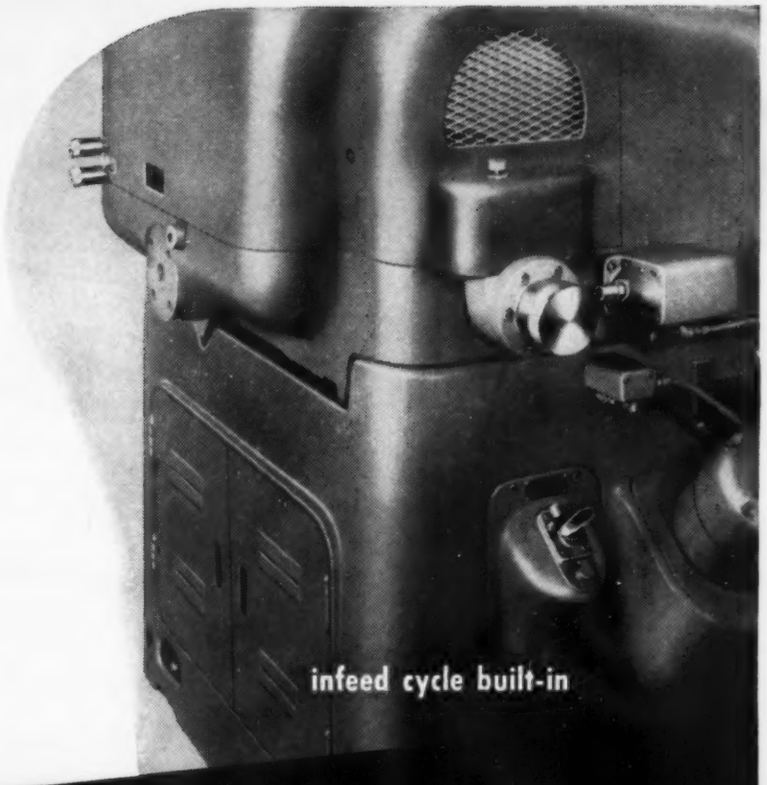
MACHINE CO. WAYNESBORO PENNA. U.S.A.

EQUIPPED WITH MICROSPHERE BEARINGS

No. 12 Centerless Grinder equipped with automatic infeed cycle and air operated work ejector. Catalog T47 describes basic machine.

LANDIS TOOL *Precision Grinders*

If you have an infeed grinding problem or other precision grinding problem, production estimates and tooling suggestions will be made on the basis of your blueprints.



infeed cycle built-in

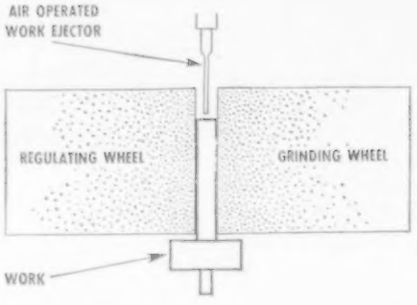
LANDIS TOOL

No. 12 centerless grinder features

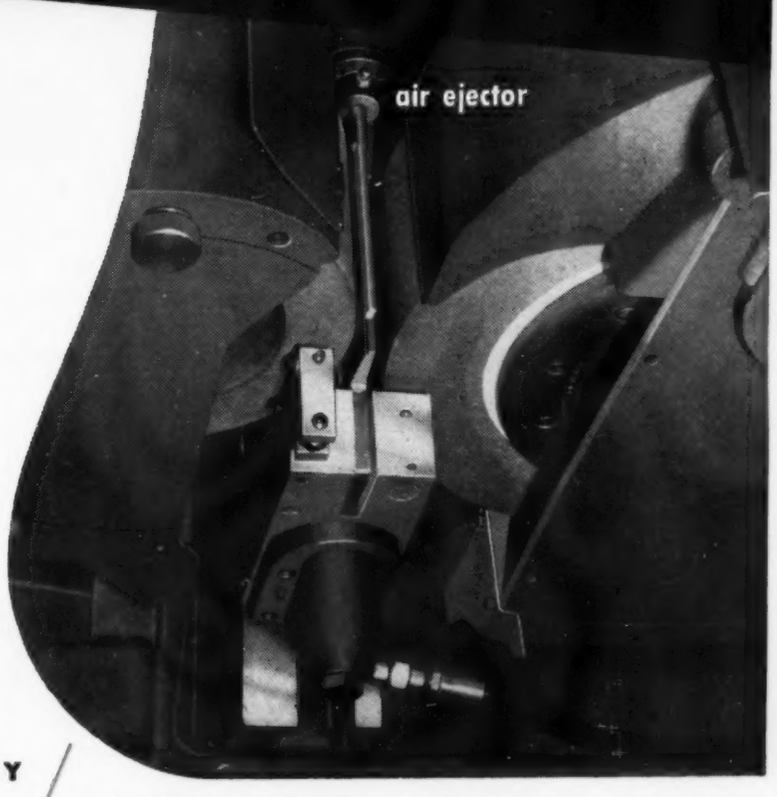
Microsphere spindle bearings for both wheel spindles.
V Belt drives
Hydraulically operated wheel dressers
Work rest solidly mounted on bed
Electrically controlled variable speed regulating wheel drive

LANDIS TOOL "PACE SETTER" Automatic Cycle

Makes Centerless Infeed Grinding More Productive



typical work set-up



air ejector

LANDIS TOOL COMPANY
10 E. SIXTH ST. / WAYNESBORO, PENNA.

It's DIFFERENT!...It's a

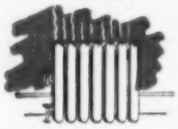
C-W SEALEDPOWER

TOTALLY-ENCLOSED....FAN-COOLED MOTOR

SAVES 80% OF MAINTENANCE COSTS

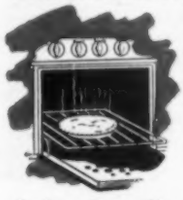
DIFFERENCES you can see in the Motor ...and in your Cost Sheets

OUTSIDE FINS DISSIPATE HEAT LIKE A RADIATOR!



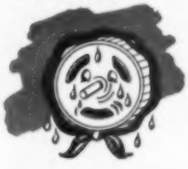
To get heat away from a Sealedpower motor Crocker-Wheeler applies the proved principles of your home radiator. Actually, the graceful *outside* fins that identify this motor add over 150% more area to "give off" damaging heat! Only a C-W Sealedpower motor has these external fins. A common-sense reason why it runs cooler, longer.

INTERIOR HAS NO "OVEN" TO KEEP IN HEAT!



Double walls are essential to *hold heat* in an oven. Not so good in a motor where the problem is to let heat *escape*. An oven is an unhealthy place to keep insulation on motor windings. So there's plenty of *cooling-sense* in the Sealedpower design that *eliminates the conventional extra* outside wall around the housing... without sacrificing protection. No motor of its type is more effectively sealed against airborne dirt, oil, moisture and fumes!

NO PLACE FOR A HEAT-HOLDING BLANKET TO BUILD UP!



When lint or dirt collects between the outside wall and the housing of a conventional enclosed motor, you get the general effect of the insulating blanket between the walls of your house. *It holds heat in.* Without a double-wall, and with all dirt sealed out, a Sealedpower motor keeps cooler because it keeps cleaner, *especially on dirty jobs!*

KEEPS CLEANER... ELIMINATES 2 OUT OF 3 CLEANINGS!

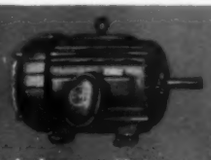
In normal (not extra dirty) service a conventional enclosed motor requires cleaning *every year,* say maintenance chiefs. A Sealedpower needs it only *every three years!* Where lint or dirt is excessive, the conventional type often should be cleaned *every 3 months,* while a Sealedpower motor will need it only *every 18 months!*

And, to clean a Sealedpower used in *normal* service only 2 simple operations are involved... taking only 15 minutes, without a shutdown. It's a money-saving cinch! Just compare it with the job of cleaning the conventional type, requiring as many as 17 operations and a 3 hour shutdown. See why a Sealedpower motor saves 80% and more of maintenance costs!

You get dollar-saving design only when you specify *C-W Sealedpower* for totally-enclosed, fan-cooled motors. Specify the *different* Sealedpower motor... with a rugged, rust and corrosion resisting cast iron frame... in *ratings from 3 to 40 hp,* horizontal or vertical, with NEMA "C" face, "B" or "D" flange mountings. Many ratings are stocked... see C-W's weekly Stock Sheet.

FOR ANY APPLICATION WHERE EXCESSIVE MAINTENANCE IS INDICATED —specify SEALEDPOWER and SAVE

Protected-Type Motors



Sealedpower Motors

Wound Rotor Motors

Direct Current Motors

Generators

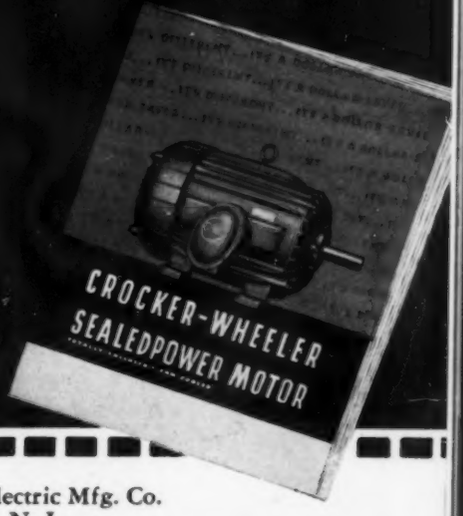
Flexible Couplings

DOLLAR SAVER!

150% MORE COOLING SURFACE
is provided by the radiating fins, exclusive with the C-W SEALEDPOWER. Here, fluttering streamers trace the fan-driven airstream that blows dust and fumes outside and away.

CROCKER WHEELER
ELECTRIC MANUFACTURING COMPANY, AMPERE 3, N. J.
A Division of The Joshua Hendy Corporation

Branch Offices:
Boston, Chicago, Cincinnati, Cleveland, Los Angeles, New York, Philadelphia, San Francisco, Pittsburgh, Washington, D. C. — Representatives in principal cities.



Before You Buy ANY totally-enclosed motor, be sure to read why SEALEDPOWER will prove a "maintenance miser" for you. This new booklet, "It's Different—it's a Dollar-saver," is packed with facts no savings-minded motor user can afford to overlook. Write for it.

Crocker-Wheeler Electric Mfg. Co.
Ampere 3, N. J.

Send the SEALEDPOWER Motor Booklet, *"It's Different—it's a Dollar-Saver"*

AM104E

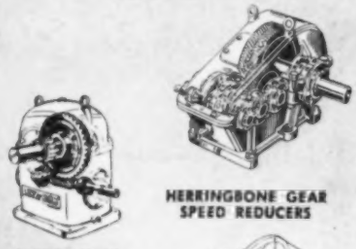
Name .....

Title or Function .....

Company .....

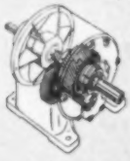
Address .....

OTHER TYPES OF LINK-BELT POWER TRANSMISSION MACHINERY

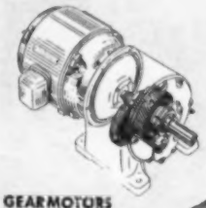


HERRINGBONE GEAR SPEED REDUCERS

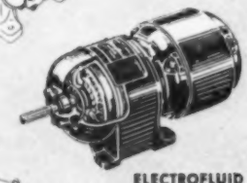
WORM GEAR SPEED REDUCERS



HELICAL GEAR SPEED REDUCERS

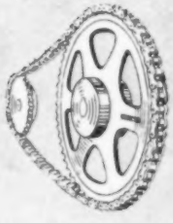


GEARMOTORS



ELECTROFLUID DRIVES

P.I.V. GEAR SPEED VARIATORS



SILVERLINK ROLLER CHAIN DRIVES

SILENT CHAIN DRIVES

STEEL AND MALLEABLE CHAIN DRIVES

V-BELT DRIVES

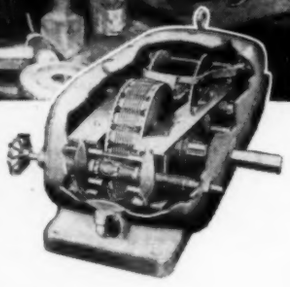
UNMOUNTED BALL AND ROLLER BEARING UNITS

ROLLER BEARING MOUNTED UNITS

BALL BEARING MOUNTED UNITS

BABBITTED BEARINGS

Most Efficient Speed For *MAXIMUM PRODUCTION*



WITH *LINK-BELT* P.I.V. GEAR

SPEED CHANGER

Coil winders in the transformer division of Westinghouse Electric Corporation typify improved production obtained when the ideal speed for each operation is provided by Link-Belt P.I.V. Gear speed changer. Formerly driven by belt from line shaft, each machine ran at a fixed speed and all coils were wound at the same rate, regardless of wire size.

Newly developed, individually driven winders employ Link-Belt P.I.V. Gear units, with 4 to 1 maximum ratio, permitting each size of wire to be wound at the ideal speed, according to its size and the operator's skill. Increased production results from the greater flexibility of the new method, by enabling two sizes of the new winders to do the range of work previously requiring four of the old single speed units driven from a line shaft.

The P.I.V. Gear speed changer, all-metal, fully-enclosed, is available in a wide range of sizes, with or without motor and extra reduction gears, for horizontal or vertical mounting. Details in Book 1874.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Offices, Factory Branch Stores and Distributors in Principal Cities.

10,378

LINK-BELT

THE SYMBOL OF QUALITY · LB · LINK-BELT

Power Transmission Machinery

38% Longer Running Time Between Grinds

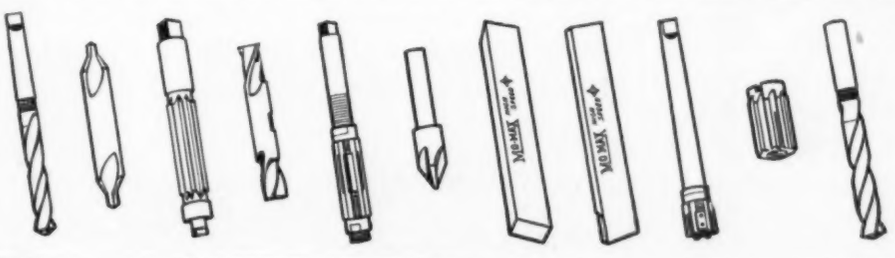
Actual test in customer's plant proves that CLE-FORGE HIGH SPEED DRILLS produce

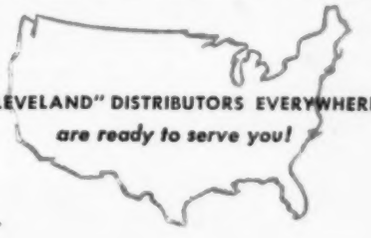
more holes per grind

A series of impartial tests on four makes of drills proved that CLE-FORGE High Speed Drills averaged 9 hours between grinds; the next best record was 6½ hours. You too can get greater production, less "down time" and lower costs by using CLE-FORGE High Speed Drills. Engineered into every one of them is the *stamina* that produces more holes per grind. Whenever you have a drilling problem, get in touch with a CLEVELAND Service Representative through our nearest Stockroom —or **Telephone Your Industrial Supply Distributor.**

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street **Cleveland 14, Ohio**
Stockrooms: **New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5**
Los Angeles 11 • London W. 3, England

ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS





5 More Reasons for

Dwell Control Right and Left Hand Table Dwell separately regulated by easily operated controls conveniently located in the center of the operating position.

Work Jogging By movement of this fingertip lever, work may be jogged at any time—whether work rotation is being automatically or manually governed.

Work Rotation Control May be either manual or automatic—at the will of the operator. A flip of this switch brings about immediate change from one to the other.

Automatic Feed at Reversal Automatic Wheel Feed at each table reversal may also be used—at the will of the operator. This automatic feed is adjustable from zero to .003" by this very simple control.

Pre-set Truing and Grinding Speeds This feature maintains separate table speeds for truing and for grinding as determined from the first work piece of the job. Immediate selection by main control lever.

SEVEN other popular features:

base ways protected at all times by space-saving steel strip guards • automatic coolant control • hinged wheel guard covers and rear base design facilitate wheel changes • pumps and electrical equipment located for maximum accessibility • sensitive, easily operated hand table traverse • smooth, all Vee-belt driven headstocks • piston rods always in tension — no buckling.

the Popularity of the new

NORTON TYPE CTU CYLINDRICAL GRINDER

MANY features of the new Norton Type CTU line act to speed up output by incorporating in these grinders a high degree of operating convenience. Thus they allow the operator more time to pay attention to the things that really get work properly done.

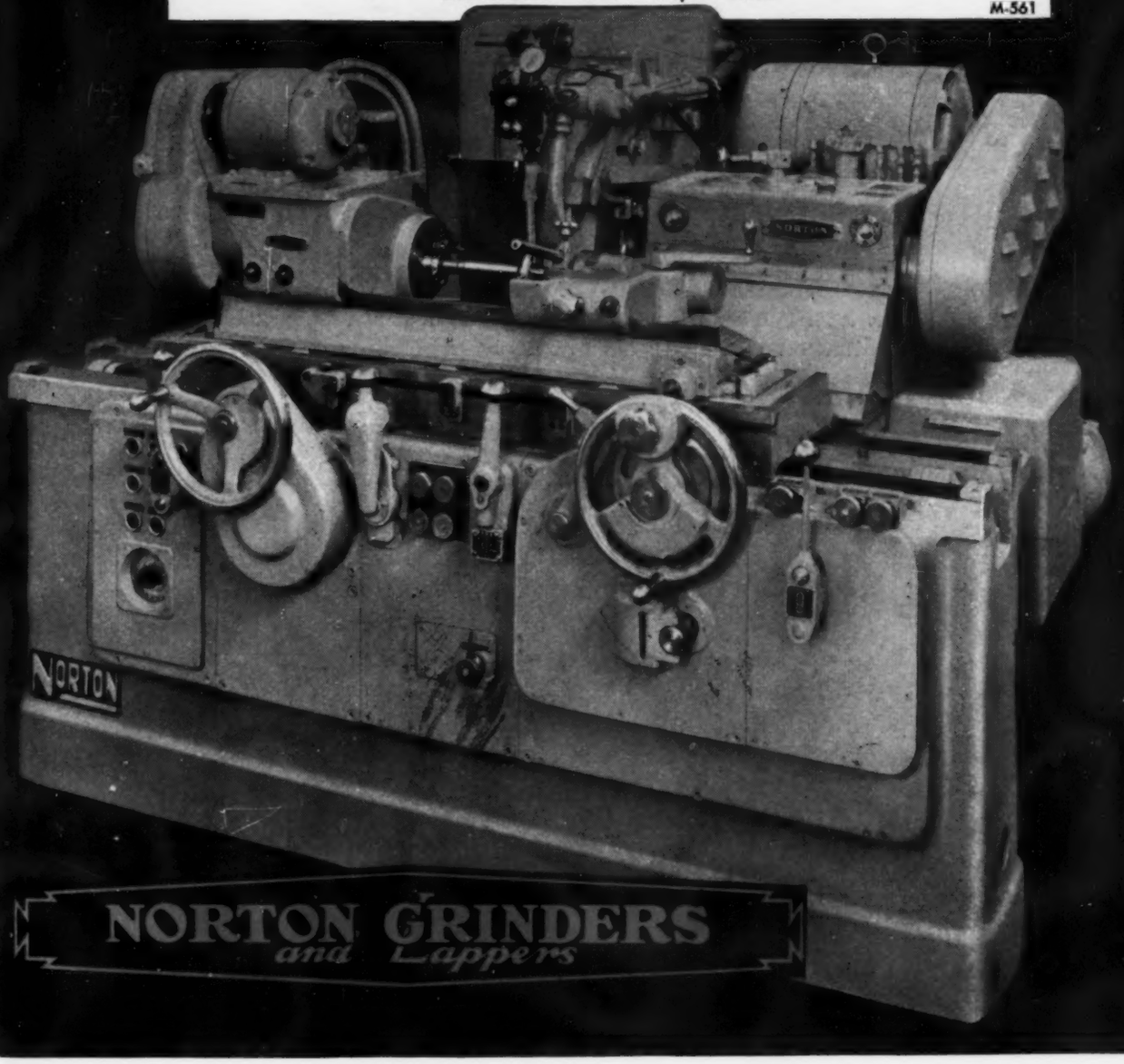
Coupled with this operating convenience are sound engineering and well proportioned design which assure sizing accuracy, high surface finish and minimum maintenance costs. Thus, the Norton CTU line has so many investment returning features that it should be included in any of your retooling programs. Catalogs available on both the 6" and 10", plain and semiautomatic — no obligation.

NORTON COMPANY, WORCESTER 6, MASS.

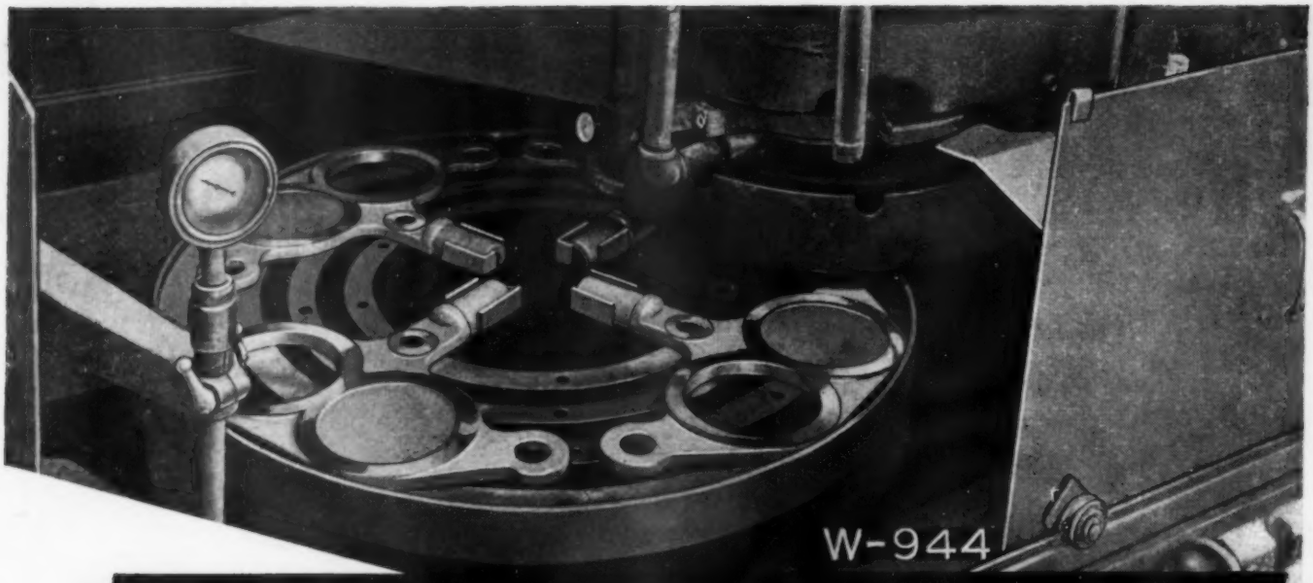
New York - Chicago - Detroit - Cleveland - Hartford

Distributors In All Principal Cities

M-561



NORTON GRINDERS
and Lappers



PUT IT ON THE BLANCHARD

(No objections to parts with projections!)

The Job: Grinding both sides of cast iron shutters for high vacuum service—removing 1/16 to 1/8" stock per side. *This part was formerly milled and scraped.*

The Method: Place 4 shutters (as shown) on the 36" magnetic chuck of a *standard* No. 18 Blanchard Surface Grinder. The fixtures necessary are the 4 unattached U-shaped steel brackets for blocking and concentric steel rings used to locate the pieces, the rings being placed over the magnetic poles of the chuck. Simply turn parts over to grind other side.

Blanchard Production: 8 pieces (16 surfaces) per hour—floor to floor.

Send for your free copy of "Work Done on the Blanchard", third edition. This new book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.

An important point to remember about BLANCHARD GRINDING is that IF THE SURFACE TO BE GROUND CAN BE BROUGHT TO THE WHEEL, A WAY CAN USUALLY BE DEVISED TO HOLD ALMOST ANY SHAPE OF PIECE.

In devising ways of holding and grinding parts with projections, Blanchard Engineers are ever ready to give every possible assistance. Avail yourself of Blanchard's Free Engineering Service—whether or not you already have a Blanchard Grinder. Simply send us the data, with samples if possible, for a prompt answer to your problem. You'll incur no obligation to purchase Blanchard equipment.

BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

Adds Years of SERVICE...

Yes, the patented double low-hung spindle drive adds years of effective service to "AMERICAN" Hole Wizard Radial Drills—and in addition insures smooth holes and more holes per drill grind

This patented spindle construction provides two drives—one through a large helical gear for the low-speed range and one through a smaller gear for the high-speed range This division of service between one large diameter and one smaller diameter gear results in low gear tooth pressures when performing large diameter drilling and boring operations through the low-speed range and low gear velocities when drilling at high speeds through the high-speed range. This is an ideal drive and unmistakably adds up to a longer and more effective life for the spindle transmission.

However, this is only part of the story. This drive is located at the bottom of the head as close as possible to the work, definitely reducing the torsional stress on the spindle, thus imparting a smooth action to it which in turn results in smooth, high quality work and prolongs the cutting edges of the tool.

The spindle itself is made of NITRALLOY steel as is also the spindle sleeve and both are nitrided for extreme surface hardness, the spindle being ground and the sleeve honed to very close limits. The spindle and sleeve are Timken mounted with an adjustment for wear This construction, combined with thorough lubrication by filtered oil, insures long life, maintained accuracy and low maintenance.

Cost-minded officials select "AMERICAN" Radials.

Will gladly send literature

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

Lathes and Radial Drills

NEW METHODS BRING "SPECIAL-MOTOR" SMOOTHNESS TO STANDARD MOTORS

Motors have been made in much the same way for many years, until Westinghouse—with many years of leadership in a-c motor developments—departed from "tradition" in electric motor concepts, and built the Life-Line.

Motor-making traditions have been broken by the basketful. Users were surveyed to find what they wanted in standard motors that they were not getting. Life-Line motors were designed and built from scratch—by new methods and new tools in a totally new plant—to include these features.

Quieter operation was one feature motor users asked for. It's important in many places—fans, blowers, air conditioning. Life-Line motors provide it. Life-Line ventilating design limits "windage" noise. New manufacturing techniques that insure absolute alignment and accuracy of fit, reduced vibration. The result is a *standard* motor with the quietness and freedom from vibration evidenced in the dramatic demonstration shown opposite. Modern tests check every motor for accuracy in manufacture.

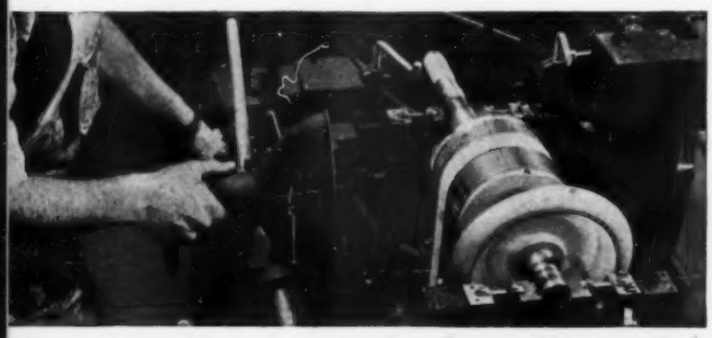
You will want full details on other Life-Line features—its solid steel construction—freedom from lubrication for 5 years or longer—new compactness and light weight. Life-Line motors, now built in sizes from 1-15 hp, are available in standard and near-standard types from stock. Other sizes and types—up to 200 hp—will soon be changed over to modern Life-Line design. Check your nearest Westinghouse office for deliveries—or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21457

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Life-Line motors

MEASURED—WITH AIR New extreme accuracy for checking diameters of shafts and bearing bores is made possible by this precision gauge. Size is checked by any variations in air stream escaping between the part being checked and the master gauge.



EVERY UNIT BALANCED. *Every* Life-Line rotor—not random samples—is balanced on a Dynetric balancing machine* to insure maximum possible freedom from vibration of every unit.
*Reg. U. S. Pat. Off.

MOTOR "ASTHMA" CHECK. Sounds that shouldn't be there don get by this "noise detective". Audiometer tells noise wave length sound level meter (left) checks decibel rating; sound analyze (right) tells the relative amount of different frequencies resulting

Life-Line
SMOOTH? HERE'S PROOF! Coin balanced on edge on a Life-Line motor remains undisturbed as motor is started, runs and stops—dramatic evidence of Life-Line's freedom from vibration and resulting noise!

THE TOUGHER THE JOB... THE MORE YOU NEED

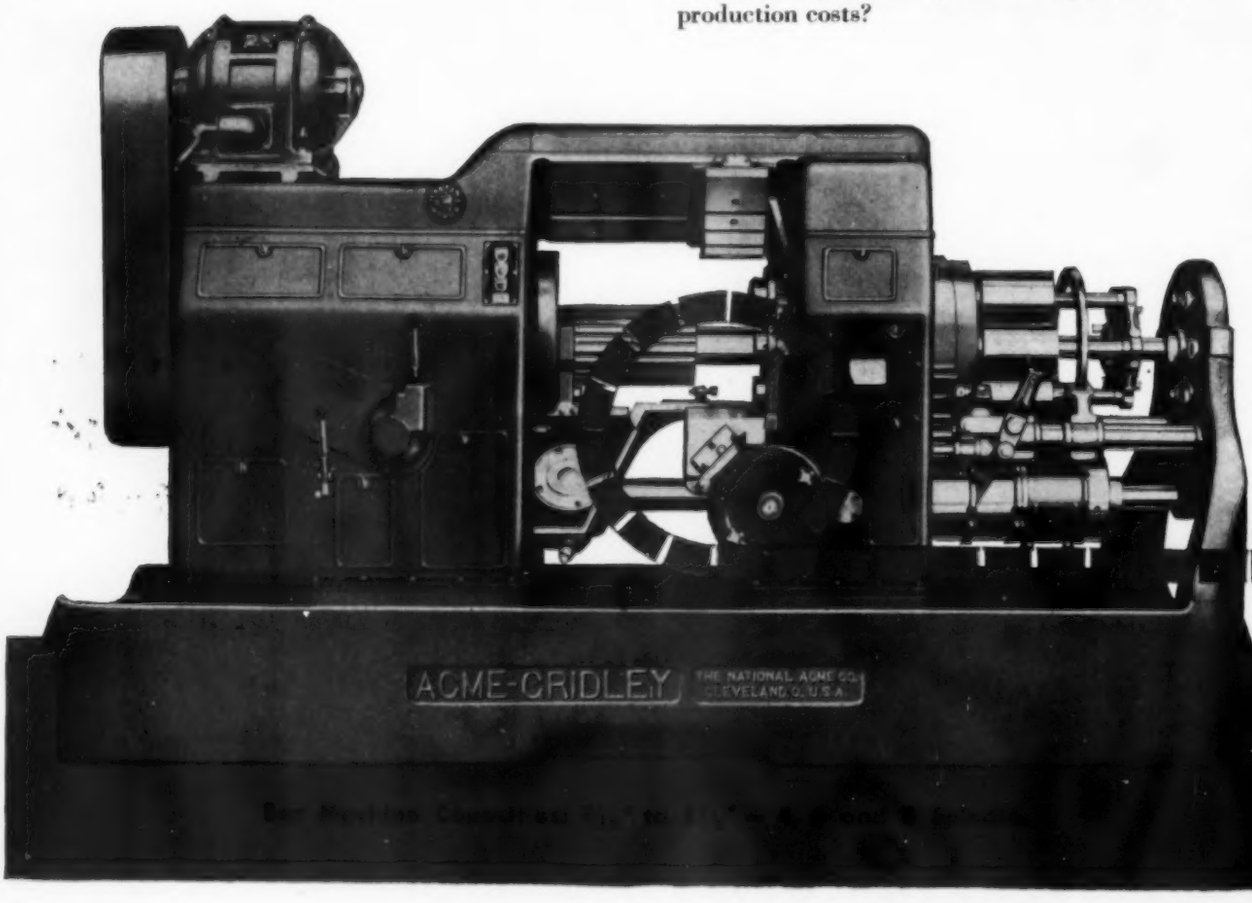
Faster production, longer tool life, minimum replacement of parts—these have been our continuing objectives in building each of the more than 40,000 automatics that bear our name.

Ever since we built the original Multiple Spindle Automatic, more than fifty years ago—and through a succession of models A, B, C, F, G, R, up to our present RA and RB machines the method of camming has played a key part in our attainment of constantly improved standards of accuracy, speed, tool life and staying qualities.

In our designs we have eliminated the use of levers, linkages and adjustable gadgets because, after thorough trial, we found them unsatisfactory. For Universal machine applications—not only from the standpoint of tool life and accuracy, but for synchronization of all slide movements—only direct and positive close-coupled camming can be depended upon to guarantee you top production under conditions of continuous heavy-duty operation.

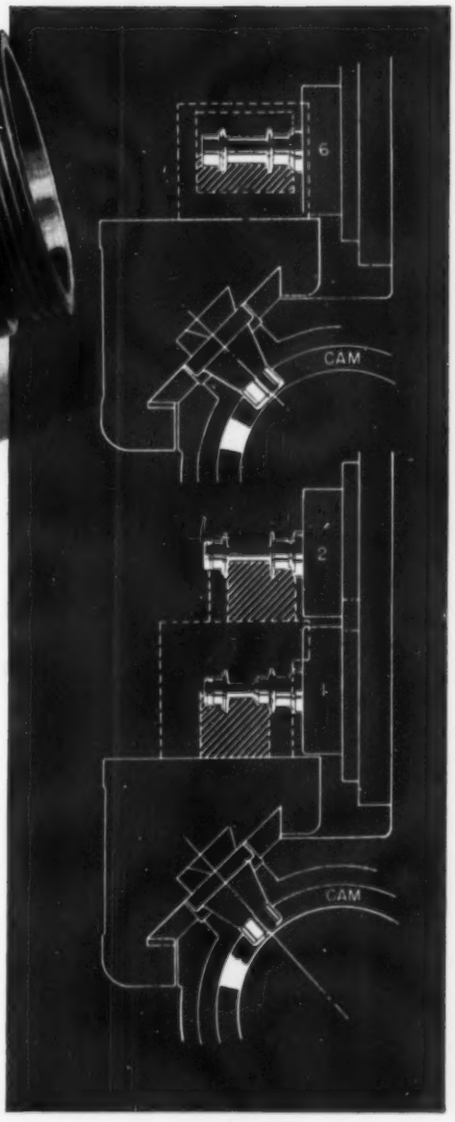
That's why we have invariably returned to the simple, direct cam and roll contact with tool slides. And that's why, in shop after shop, in the country's leading metal-working production plants, our customers are finding *more good pieces in the pan* at the end of the shift when the job is done on Acme-Gridleys.

If you want top return on your investment in machines, Acme-Gridleys with Quick-Change Cams—changed only when necessary—are your best bet. May we show you how they'll cut your production costs?



ACME-GRIDLEY
Positive Camming

JOB FACTS

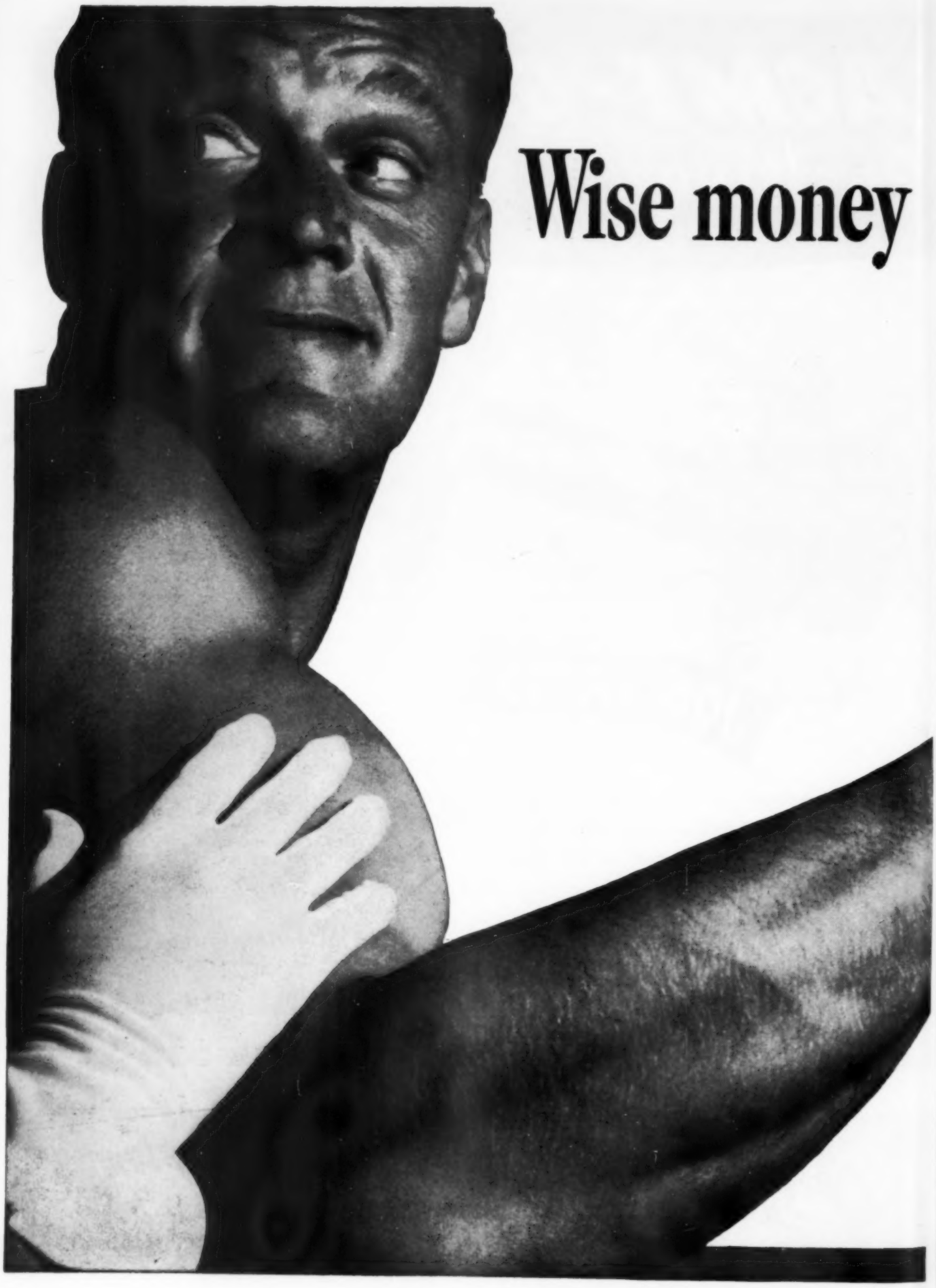


13 operations in 1 minute, 25 seconds, to machine this bicycle hub from 2" SAE 1112 bar stock on a 2⅝" RB Acme-Gridley 6 spindle bar machine. Wide forming cuts—of the kind that take machine stamina—are performed: three heavy forming cuts and shaving the front and back shoulders. Note tooling diagram at right, graphically showing the advantages of Acme-Gridley positive, direct close-coupled camming to the tool slides.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing


Wise money

rides on the champ

THE odds favor the champion. The champion got to the top by fighting his way there, by beating all challengers. That's why, in each new battle, the wise money is placed on the champ.

The champion has a record of successes; he has wise handlers who carry him through to *more* successes.

For this same reason, it does not pay to play hunches in your selection of alloy steels. Carilloy steels have a record of exceptional performance under all kinds of unusual conditions. And Carilloy's handlers – the Carilloy metallurgical engineers – are recognized authorities in the field of alloy steels.

When these engineers size up the job you have to do, they bring with them years of experience in the highly specialized field of alloy steel application. And they play no favorites because they have a complete list of fine alloy steels to pick from—bearing steels, aircraft steels, gear steels, Nitralloy steels, high temperature steels and low temperature steels, regular and special analysis steels of every kind. In any form and in any size.

So if your job requires the unusual in strength, toughness, durability, stamina, fabricating qualities—get their expert opinion. They'll help you pick the alloy steel that's right for the job and that you can put your money on with confidence.

U·S·S Metallurgical Engineers and the outstanding research organization behind them have played a leading part in the development of the triple-alloy NE steels, and in the inception and introduction of hardenability bands, isothermal transformation studies, and new and improved heat treating methods. Through constant research and experiment these experts are continually expanding the usefulness and efficiency of special steels for the special jobs of industry

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST TO COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH
COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

USS

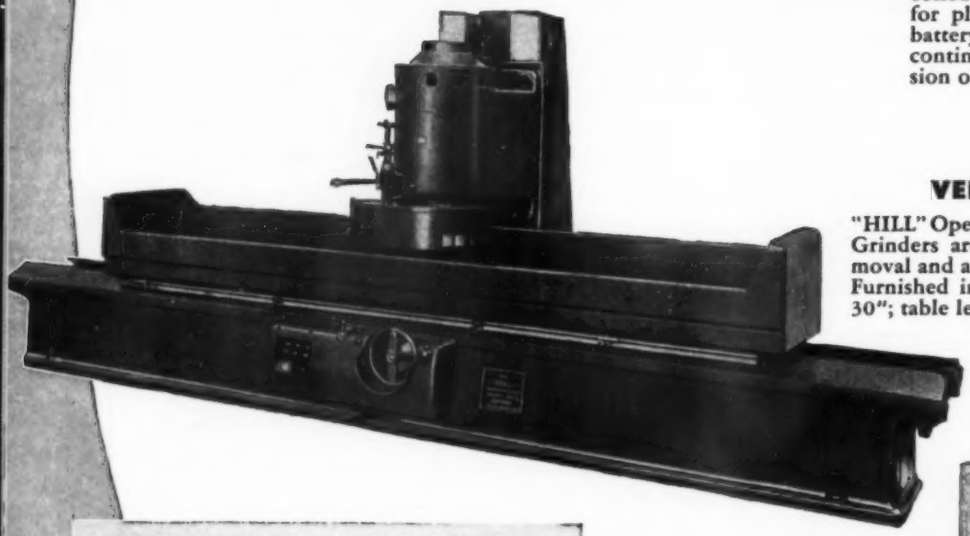
UNITED STATES STEEL

HILL ACME

Tools for Industry

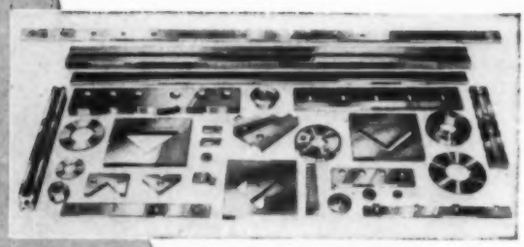
GRINDING *and* POLISHING MACHINE

"HILL" 2-Roll Vertical Abrasive Belt Hydraulic Table Type for flat polishing of ferrous or non-ferrous sheets and other materials ... also, built in Strip Type for processing strip material in coiled form ... also, made in Pinch Roll Type for plate or bar stock, whereby, a group or battery of machines can be placed in series for continuous polishing. Furnished in a progression of widths up to 60".



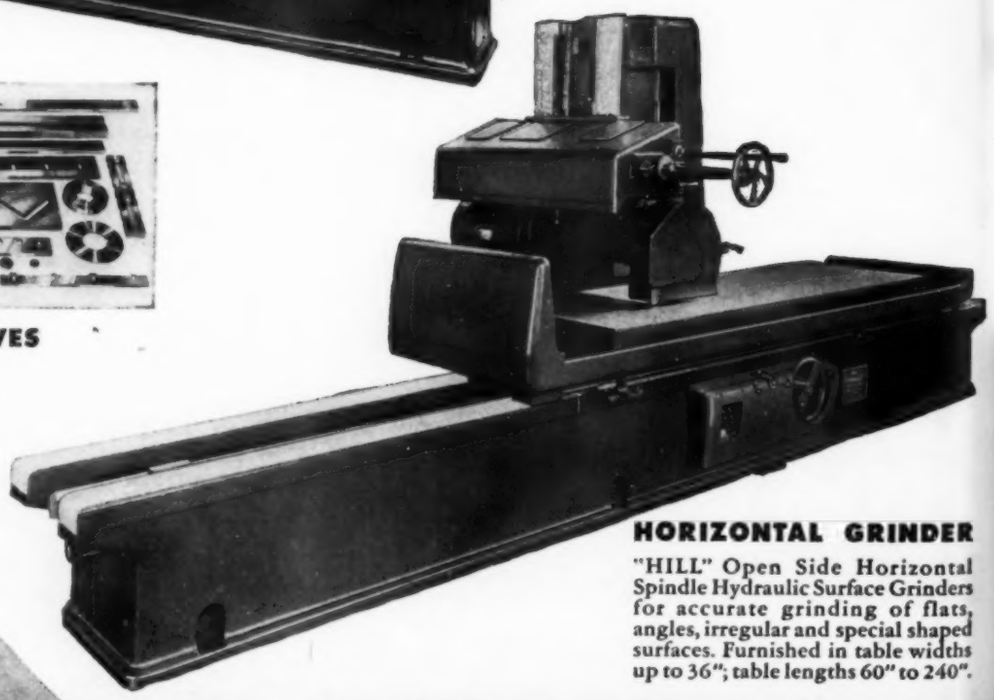
VERTICAL GRINDER

"HILL" Open Side Vertical Spindle Hydraulic Grinders are designed for rapid stock removal and accurate grinding of flat surfaces. Furnished in table widths of 18", 24" and 30"; table lengths 60" to 240".



SHEAR KNIVES

"CLEVELAND" Knives and Shear Blades. Solid and laid steel shear blades; rotary slitting and side trimming knives; metal cutting machine knives.



HORIZONTAL GRINDER

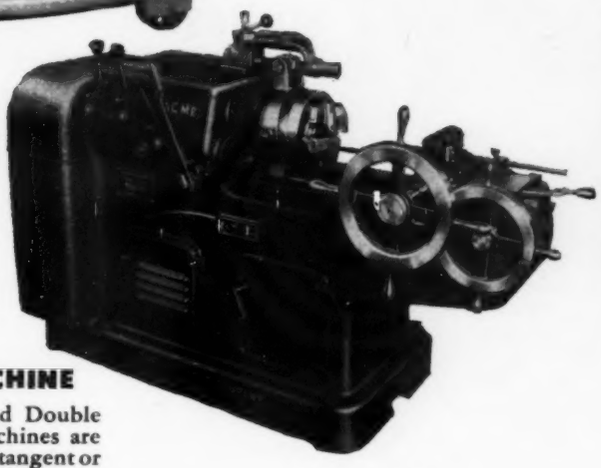
"HILL" Open Side Horizontal Spindle Hydraulic Surface Grinders for accurate grinding of flats, angles, irregular and special shaped surfaces. Furnished in table widths up to 36"; table lengths 60" to 240".

FLOOR CRANE

"CANTON" Portable Cranes are constructed of welded steel, with high tensile drop forgings; equipped with self locking worm as safety feature. Made in eight sizes from 1 to 3 ton capacity. Fast, safe, one-man operation.

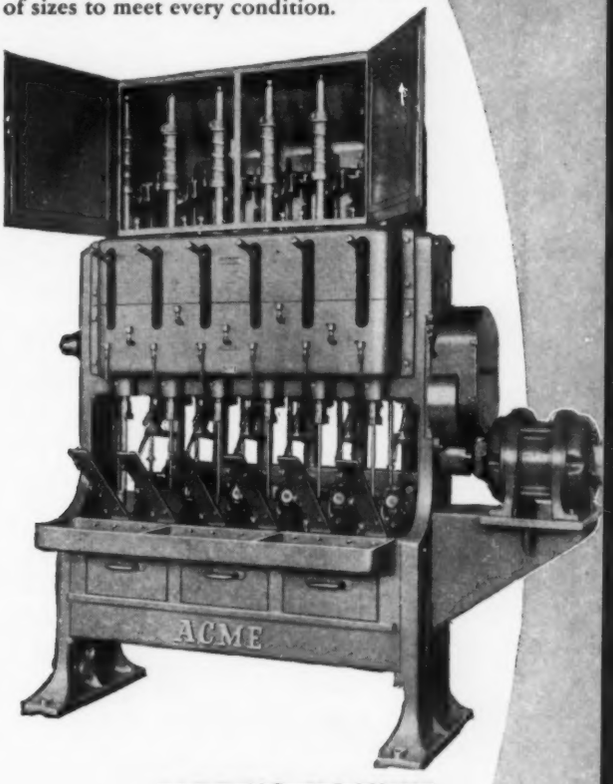
ALLIGATOR SHEAR

"CANTON" Alligator Shears are the most rugged, powerful and trouble free shears ever built for processing scrap. Modern design has produced a stronger shear, with fewer parts, and positive lubrication. Made in a full range of sizes to meet every condition.



THREADING MACHINE

"ACME" XL Single and Double Spindle Threading Machines are equipped with patented tangent or hob type die head which assures economical, accurate, high speed production. Furnished in sizes from 1" to 3" capacity.



TAPPING MACHINE

"ACME" Tapping Machines for accurately threading nuts and pipe couplings. Built in 4, 6 and 8 spindle sizes with capacities of 1, 2 and 3 inches.

FORGING MACHINE

"ACME" XN Forging Machines produce accurate, quality forgings for long uninterrupted periods. Massive construction and simplicity of operation insure years of trouble-free service. Built in 7 sizes from 1 to 5 inches.

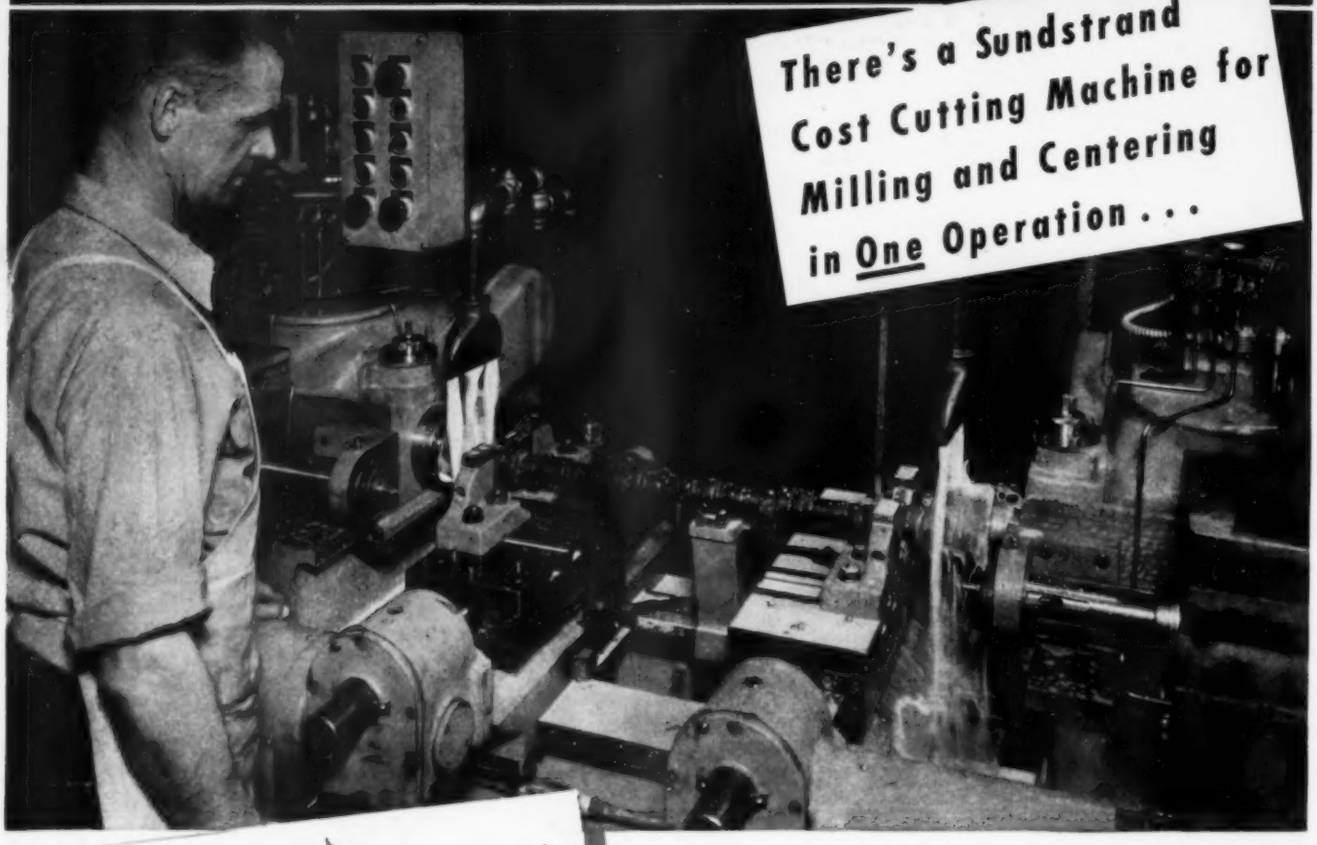
TOOLS FOR INDUSTRY

The HILL ACME Company

PLANTS AT 6400 BREAKWATER AVENUE
AND 4533 ST. CLAIR AVENUE

Cleveland 2, Ohio

WHETHER IT'S BIG PARTS OR SMALL-SIMPLE OR COMPLICATED...



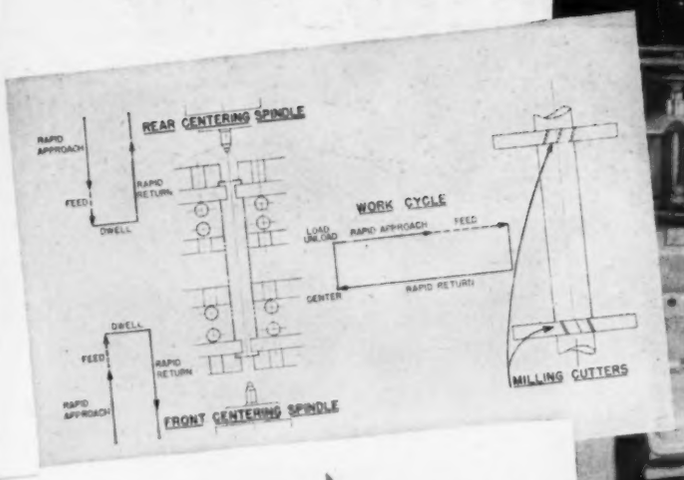
FOR BIG PARTS Here's a Sundstrand machine milling and centering both ends of a camshaft. It is adjustable for handling a range of work from 1" to 3½" diameter and 8" to 48" long. It has power operated vises and a complete automatic cycle after loading. Other sizes of similar machines for handling work up to 6" diameter and 84" long are available.

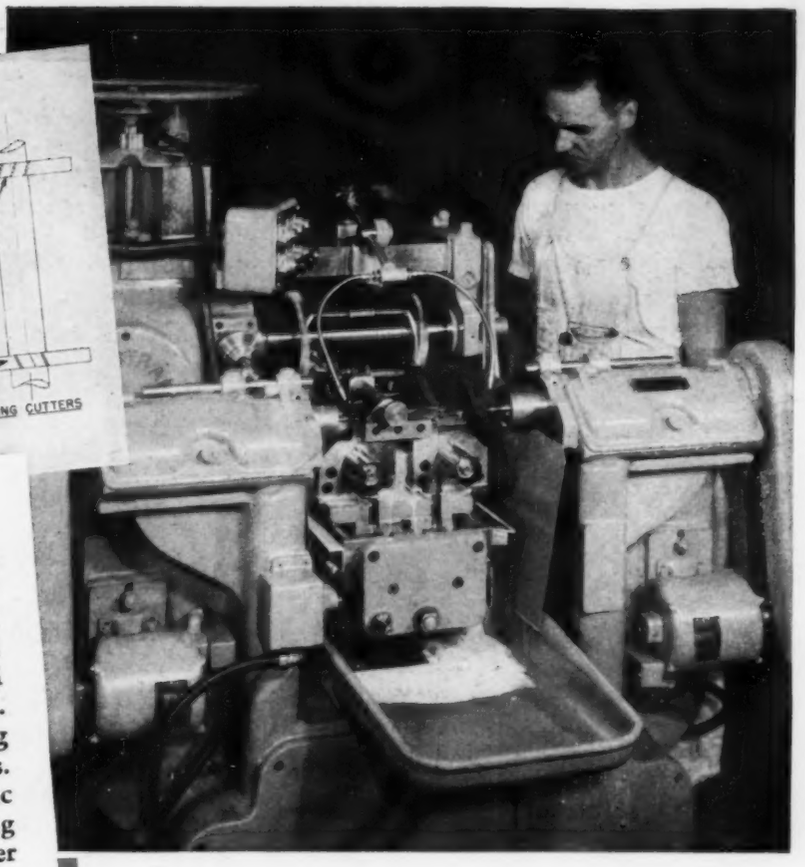
If your work includes milling to length and centering of either big parts or small parts, you will save time and get more accurate work with a Sundstrand Milling and Centering Machine. It saves time, because it mills to length and centers in the same set-up. The work is handled once instead of twice. Extreme accuracy is obtained by performing *both* operations with a single clamping of the part, thereby maintaining a definite relation between the ends and centers. All sizes of machines are flexible and can easily and quickly be adjusted to handle different diameters and lengths of parts, making it profitable to include small as well as large lot sizes. Manufactureres of tractors, farm implements, aircraft parts, automobiles, diesel engines, gasoline engines and many others are now using these machines to advantage. It will pay you to investigate the time saving and accuracy features of these machines.

Whether your work is on small parts or big parts or both, there is a Sundstrand Milling and Centering Machine to fit your job. Merely send your part prints giving production required, and our engineers will be glad to assist you in determining the proper machine for your milling and centering operations.

SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

RIGIDMILS • FLUID-SCREW RIGIDMILS • AUTOMATIC LATHES • HYDRAULIC EQUIPMENT



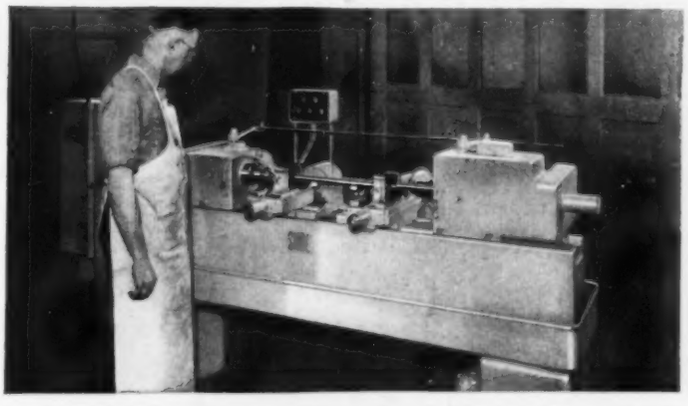


FOR SMALL PARTS Here's the new small Sundstrand Milling and Centering Machine designed to take work from 3″ to 11″ long and from ⅜″ to 1½″ in diameter. It will handle center drills from 13/64″ to ½″. It has adjustment for varying milling feeds and speeds and center drill speeds. The machine has a complete automatic cycle except for loading and unloading and is equipped with adjustable power operated quick loading vises.

The machine illustrated above mills to length and centers four different sizes of small outboard motor crankshafts which range from 7″ to approximately 10½″ in length. The machine is equipped with power operated vises and automatic cycling so operator's only duties are to load and unload and start the automatic cycle.

FOR DRILLING AND CENTERING ONLY

If your work does not require both milling and centering, here is a machine for centering only. It is a new improved model which is usually furnished with power or hand control. However, it can also be furnished with a combination of power feed and hand operated vises or manual feed and power operated vises. Write for new bulletin covering complete specifications of No. 53A drilling and centering machine.



FREE ADDITIONAL DATA Complete data including specifications and machine features are fully described in these bulletins. Write for your copies today. Ask for Bulletins No. 176.

SUNDSTRAND MACHINE TOOL COMPANY

2533 Eleventh St. • Rockford, Ill., U.S.A.

DRILLING AND CENTERING MACHINES • SPECIAL MILLING AND TURNING MACHINES

NOW...take this Handy Way to Count anything you want!

...use a Veeder-Root Hand Tally

GET AN ACCURATE *"RULE OF THUMB"* on anything you want to count, from poles to people... with this compact precision instrument (shown actual size). It's quicker than a pencil... more reliable than your memory... and can be comfortably carried in your pocket at all times.

Every time you press the thumb-lever, another count is added, all the way up to 10,000. Then turn the knurled knob *once,* and all figures reset to zero. This is the *"counter of countless uses"*... an indispensable daily companion for anyone concerned with figures. Get a Veeder-Root Hand Tally today... or order it direct.

VEEDER-ROOT INC., HARTFORD 2, CONN.

In Canada: Veeder-Root of Canada, Ltd., 955 St. James Street, Montreal 3
In England: Veeder-Root Ltd., Dickinson Works, 20 Purley Way, Croydon, Surrey

Look for this Box at Hardware and Sporting Goods Stores ... also at Mill Supply Dealers, Industrial Distributors, Hospital and Hotel Supply Houses

...only $7.50

YOUR HAND TALLY WILL COUNT:
Traffic · Packages · Livestock · Inventories · Phone Calls · Poles · Trees
Shrubs · Tickets · Attendance at Games and other events · Restaurant Servings
Equipment Stocks · Idle Machines in Plants · or anything else you may want to count!

New!

a quick, positive way to identify tool steel bars!

NOW . . . CARPENTER MATCHED TOOL & DIE STEELS ARE PAINTED FULL LENGTH!

at last you can

- Quickly Identify Steels In Stock
- Reduce Your Own Marking Costs
- Eliminate Costly Stock Mix-Ups
- Simplify Inventory-Taking

Discover how this new marking system can help you . . .

THE CARPENTER STEEL COMPANY • READING, PA.

SEE OTHER SIDE

This New Marking Program Gives You

4 NEW WAYS TO REDUCE TOOLING COSTS!

1. QUICKLY IDENTIFY STEELS IN STOCK! No more "guesswork" when selecting steels from stock. Every Carpenter Matched Tool and Die Steel is now painted end to end with its own distinctive color.

2. REDUCE YOUR OWN MARKING COSTS! With this new marking method the identifying color stays with small pieces cut from bars, and on short lengths put back into stock.

3. AVOID COSTLY STOCK MIX-UPS! At last you can reduce the danger of using the wrong steel for the job—and ruining an otherwise perfect tool or die.

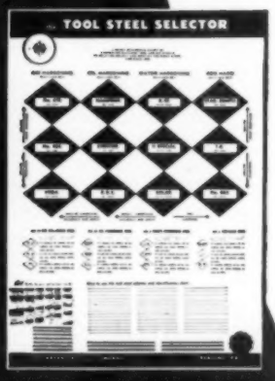
4. SIMPLIFY INVENTORY-TAKING! By knowing at a glance "which steel is which" you can speed-up inventory-taking, eliminate confusion in stocking, and reduce time spent handling tool steels.

NOW . . . A Complete, Simplified Program to Help You Get Better Tools and Dies!

Here, for the first time, is a complete program that helps you take the guesswork out of selection, identification, and heat treatment of tool and die steels. For many years tool makers have used the Carpenter Matched Set Method to simplify tool and die steel selection and heat treatment. Now going one step further, Carpenter's new bar painting system is your insurance against "mistaken tool steel identity". Each "diamond" on the new 12-color Wall Chart represents a steel in the Matched Set. By following directional arrows—"North" for extra wear resistance, "South" for greater toughness, etc., you quickly arrive at the one steel best suited for each job. Simply use the Chart to select the steel you need—then go to your stock rack and pick out the bar with the corresponding color. It's easy, saves time, reduces costs.

Start now to cash-in on all the exclusive benefits you get with Carpenter Matched Tool and Die Steels. Be sure your orders call for "Carpenter". Meanwhile, write for your Tool Steel Selector and Identification Wall Chart, now.

The Carpenter Steel Co., 109 West Bern St., Reading, Pa.



The new 21"x30" Tool Steel Selector Wall Chart now printed in 12 different colors to quickly identify each Carpenter Matched Tool and Die Steel.

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Carpenter **MATCHED TOOL & DIE STEELS**

Painted Bars in Stock — Ready for Immediate Delivery!

Atlanta, Baltimore, Birmingham, Ala., Boston, Bridgeport, Conn., Buffalo, Chicago, Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Mich., Hartford, Houston, Indianapolis, Kansas City, Los Angeles, New York, Philadelphia, Providence, St. Louis, Worcester, Mass., In Canada: Toronto, Montreal

Export Department, 233 Broadway, New York 7, N. Y. "CARSTEELCO"

SEE OTHER SIDE

FOR SOFT STOCK
FINE PITCH
SHORT LENGTH
CLOSE-TO-SHOULDER
THREADING

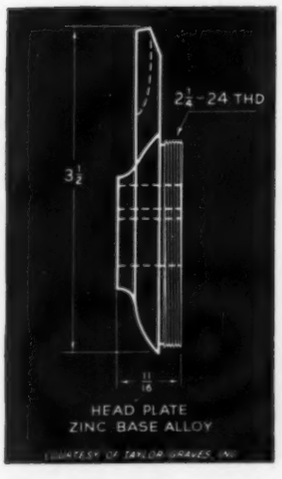
External Trip Attachment

FOR ALL JONES & LAMSON STATIONARY TANGENT DIE HEADS.

Provides low cost threading in BRASS, ALUMINUM, ZINC, PLASTICS and other soft materials. Cuts as little as *one full turn of quality thread, with automatic release!*

We believe we can help you. Why not call or write us about your threading problems?

SCRATCH JOBS LIKE THIS OFF THE TROUBLE LIST!



Fine pitch threading in cast zinc alloy . . .
Material too soft to stand pull-off pressure of ordinary die . . .
Overtravel dangerous due to close shoulder and projecting lug . . .
Quite a problem!

Yet a Jones & Lamson Tangent Die, equipped with an EXTERNAL TRIP ATTACHMENT, takes this job in stride. *It trips without pulling against the threads*—no danger of stripping or side trimming. Precise stop control eliminates all risk to work, die or chasers.

Thread Tool Division

J&L JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835

see it now!

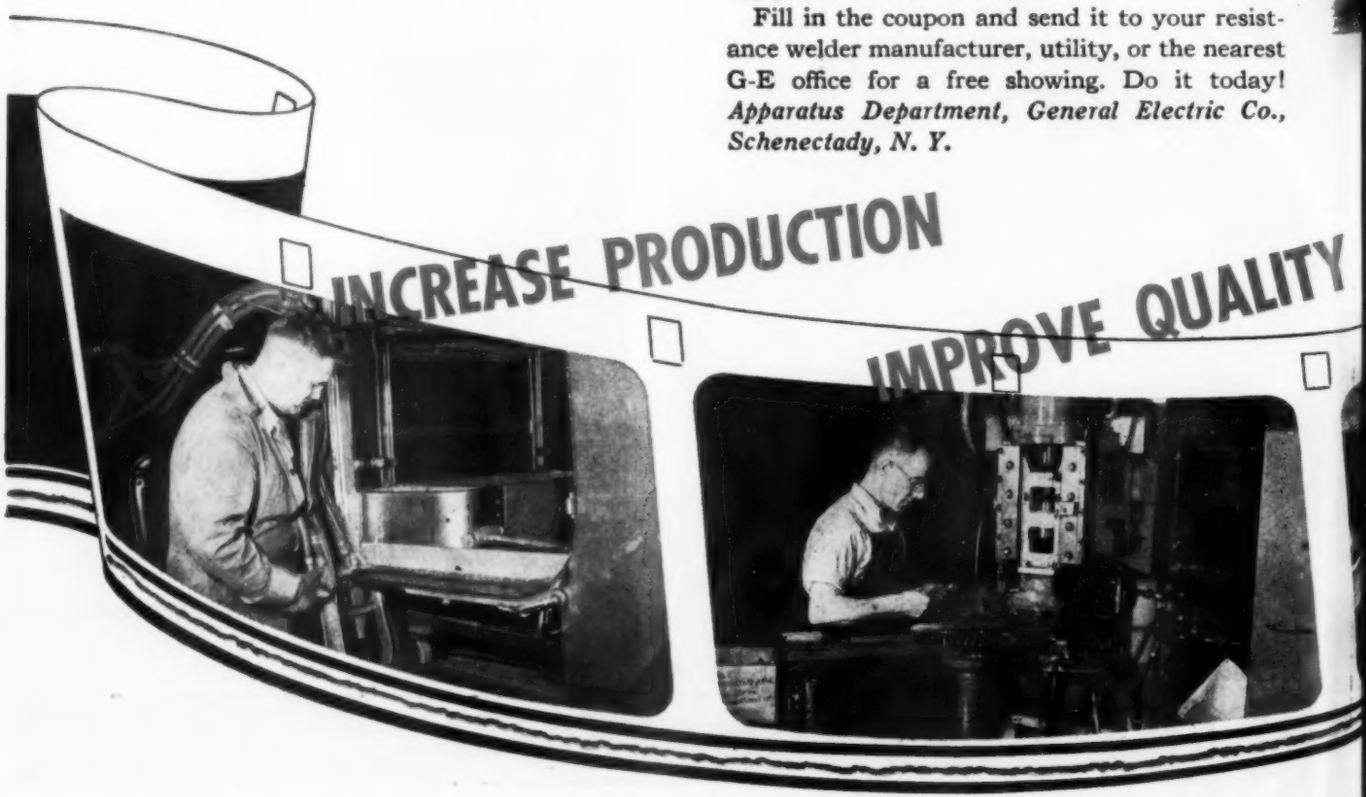
Packed with tips for product designers, resistance welder operators, and production men

SEE HOW successful manufacturers of all types of metal products are utilizing the various types of resistance welding to best advantage. **WATCH** the welding of metal boxes in a plant that now saves $84,000 and 7000 pounds of tin each year with seam welding. **SEE** other equipment such as cabinet trays now being produced at a rate five times that of a former method. **HEAR** how a manufacturer of airplane fuel tanks was able to reduce the weight and produce the tanks at one-sixth the former cost. **YOU, TOO,** may be able to replace seven operations with one as another manufacturer did when he installed projection welding.

Operators will better understand electronic control through the animated cartoons and simplified explanation of the factors (such as the type of material to be welded, its thickness, and electrical resistance) determining the magnitude and timing of current.

At the showing of the film you will also receive a review manual that describes all phases of resistance welding and contains a section of interest to engineers who are faced with increasing power loads.

Fill in the coupon and send it to your resistance welder manufacturer, utility, or the nearest G-E office for a free showing. Do it today! *Apparatus Department, General Electric Co., Schenectady, N. Y.*



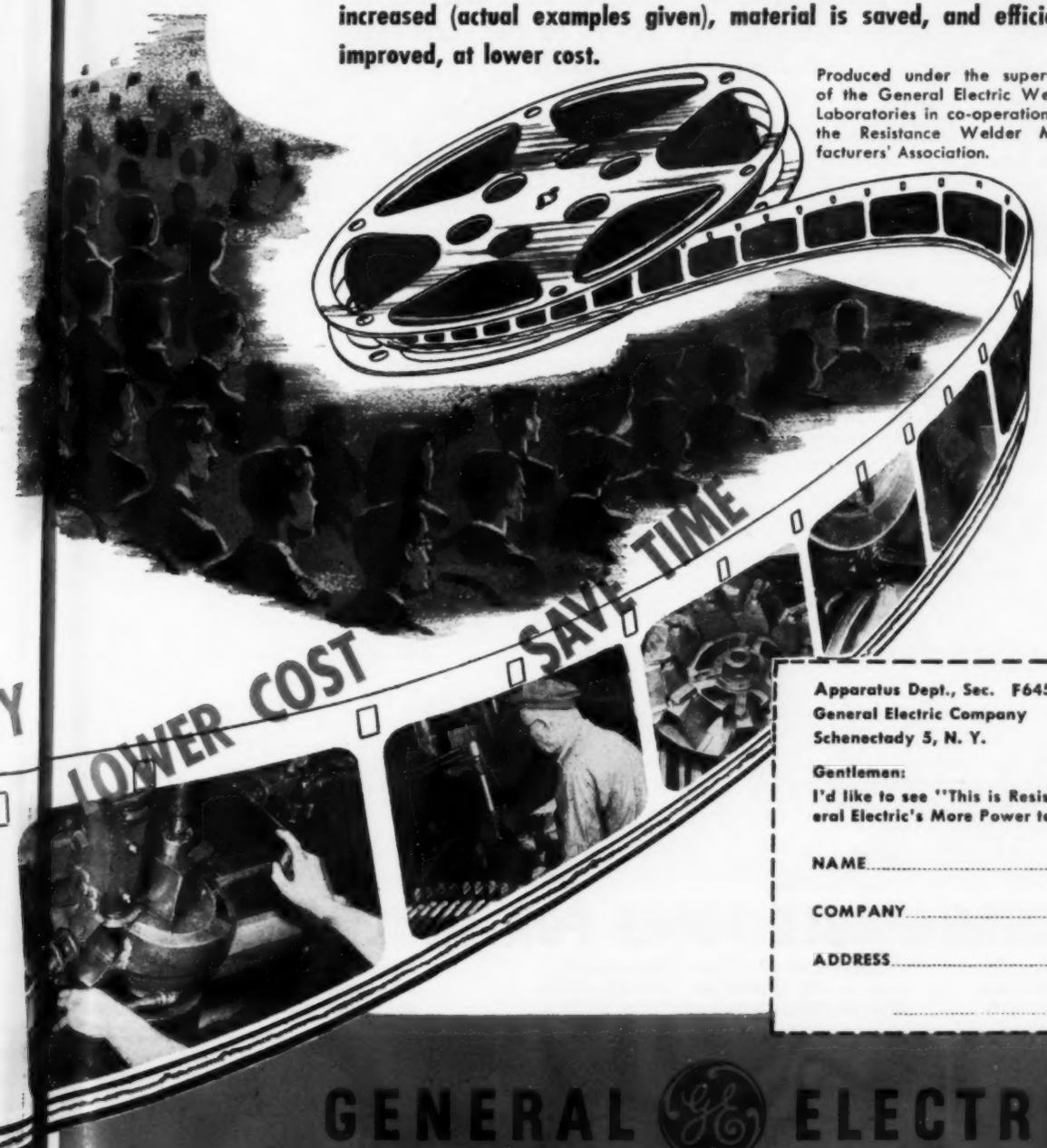
"This is Resistance Welding"

NEW 30-MINUTE, FULL-COLOR, SOUND MOTION PICTURE

DESCRIBES . . . INSTRUCTS . . . EXPLAINS . . .

all phases of resistance welding—spot, seam, and projection. Shows how each type can best be used, how rejects can be cut, production increased (actual examples given), material is saved, and efficiency improved, at lower cost.

Produced under the supervision of the General Electric Welding Laboratories in co-operation with the Resistance Welder Manufacturers' Association.



Apparatus Dept., Sec. F645-46
General Electric Company
Schenectady 5, N. Y.

Gentlemen:
I'd like to see "This is Resistance Welding," General Electric's More Power to America movie.

NAME.....

COMPANY.....

ADDRESS.....

.....

GENERAL ELECTRIC

MAKE HARD SET-UPS EA
UP TO 50% LESS T

Kearney & Trecker's New Milling Machines with Built-In Chuck-Type Table Use Standard Tools to Set-Up Any Workpiece — Eliminate Expensive Workholding Fixtures.

The secret of using Kearney & Trecker's new milling machines with Built-In Chuck-Type Table lies in especially designed interchangeable standard tools or accessories that readily adapt themselves to any set-up. Thus the Built-In Chuck-Type Table actually eliminates the need for *costly* workholding fixtures.

You'll find hard-to-hold workpieces with irregular or curved contours easily clamped and leveled using combinations of spring and screw jacks and various styles of vise jaws which fit on standard bases. Similarly a variety of bumper-stops may be used as the work demands.

In actual shop tests, workpieces both large and small, simple and complex, have been set up and machined in fractions of the time formerly required. What's more, the simplicity of set-ups has materially reduced operator fatigue and provided greater rigidity plus more accurate finished results.

Kearney & Trecker milling machines with the Built-In Chuck-Type Table are available now in three standard working ranges, plain or vertical styles: (1) 34″ power table feed — Models 2K, 3H and 20 CSM. (2) 42″ power table feed — Models 3K, 4H and 30 CSM. (3) 50″ power table feed — Models 4K, 5H and 50 CSM. Accessories include screw and spring jacks, bumper stops and a variety of interchangeable, reversible vise jaws with hard, soft, plain, serrated, flat or radius faces depending on the surface or material to be clamped.

If you are planning on new milling machine equipment in your shop — it will pay you to get complete details on the new Kearney & Trecker milling machines with the Built-In Chuck-Type Table. Contact your nearest Kearney & Trecker Office or Dealer, or write direct to Kearney & Trecker Corporation, 6784 W. National Ave., Milwaukee 14, Wisconsin.

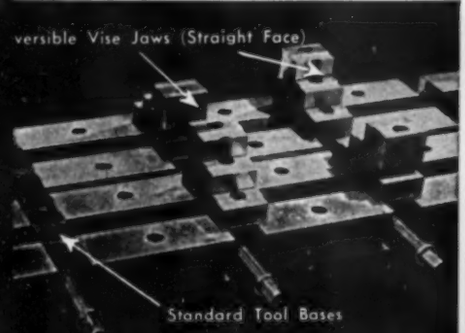
KEARNEY & TRECKER
MILWAUKEE
MACHINE TOOLS

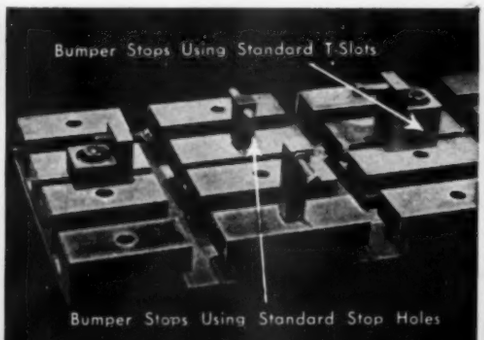
HOW INTERCHANGEABLE TOOLS FOR CHUCK-TYPE TABLE MA

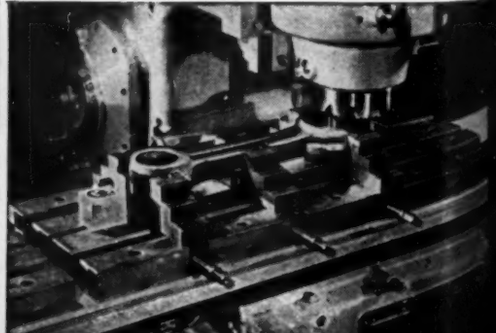
Standard tool bases quickly position in large specially designed table slots. Reversible vise jaws rigidly bolt to bases.

Variety of standard bumper-stops available to fit almost any set-up. Note different heights and positions possible.

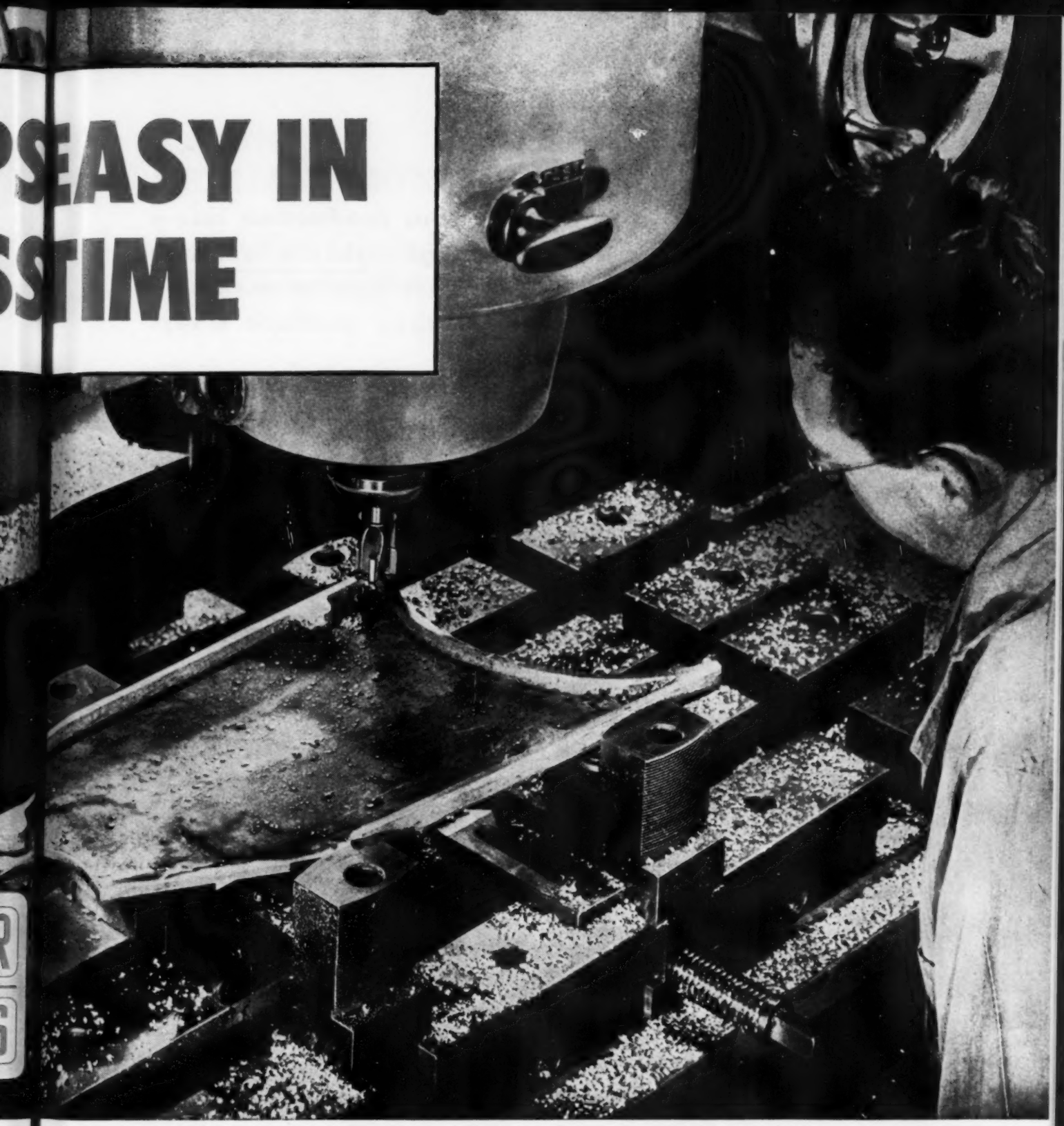
Here's how quick positioning of bases, mounting of jaws and single bumper-stop combine to make fast, rigid set-up.







PSEASY IN SSTIME



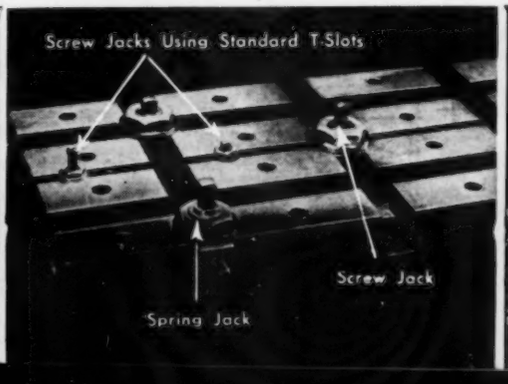
BLE MAKE EASY SET-UPS—ELIMINATE EXPENSIVE FIXTURES

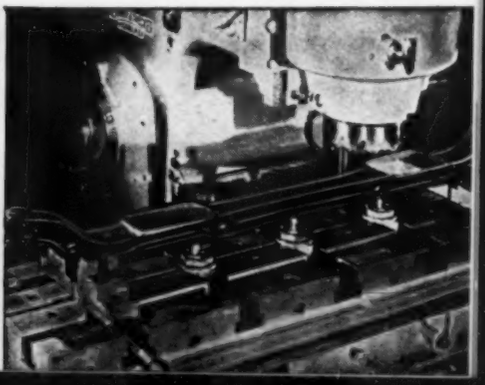
ases, per- t-up.

Curved surfaces on workpieces are easily clamped using radius-face, reversible vise jaws rigidly bolted to standard bases.

You get quick, accurate leveling on any workpiece using a variety of screw or spring jacks. Note various positions.

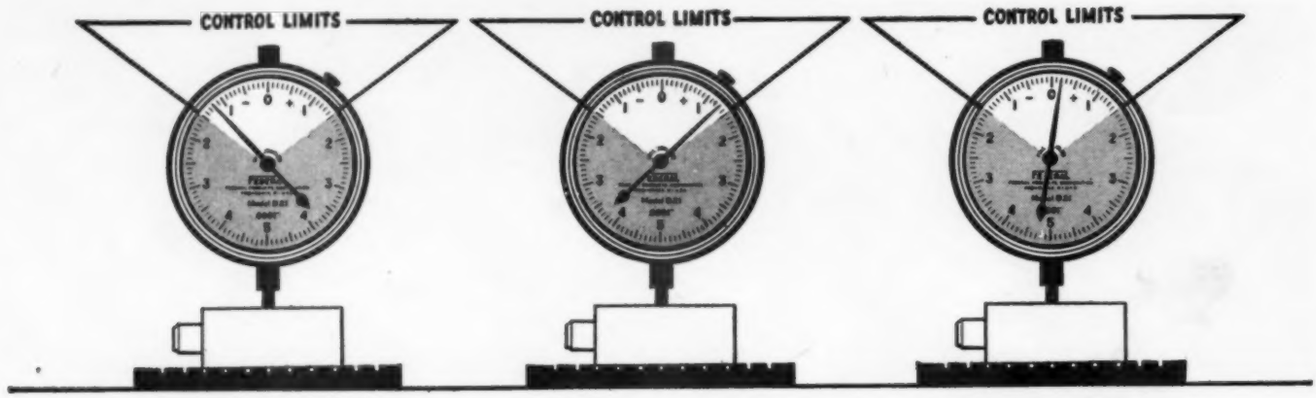
Here's typical, fast, simple set-up for carbide milling an axle part using both screw jacks and serrated vise jaws.





Warning!

It's time for new eyes in your production line – to make the work come through right the first time – to let your workers see what they're making – to adjust machines before they produce scrap.



I'm about to produce under-size pieces!

I'm about to produce over-size pieces!

I'm well within my control limits!

Dial Indicator Gages tell the mechanic what he wants to know. They show him whether the part is too large or too small; they also show him *exactly how much the workpiece is off standard.* He gets an accurate reading *at a glance;* he saves time; he no longer relies on the sense of "feel".

Furthermore, and most important, the Dial Indicator tells the operator exactly how much the work is tending toward the high or low limit. Hence, he knows how much or how far to readjust the setting of the machine.

When control limits are set up on a Dial Indicator, the machine's tendency to exceed these limits is quickly spotted; the machine is adjusted *before the scrap is produced.*

This method of Quality Control is adaptable to both large and small-scale production —and to many non-mechanical products, as well as to mechanical. A Dial Indicator can be applied to gage any linear dimension.

We make Dial Indicators and Dial Indicator Gages — both regular and custom-built — to meet the needs of users in hundreds of industries. For highly specialized needs, we also make Air Gages and Automatic Electronic Sorting Gages. Our collective experience is available to you—through the Federal field representative in your territory or direct from our design department and factory. You may save both time and money by calling upon this experience.

COLOR FILMS loaned on request—showing fundamentals and uses of Dial Indicator Gages

FEDERAL
FEDERAL PRODUCTS COPORATION

YOUR PROFIT DECISION IS *Visible** PRECISION

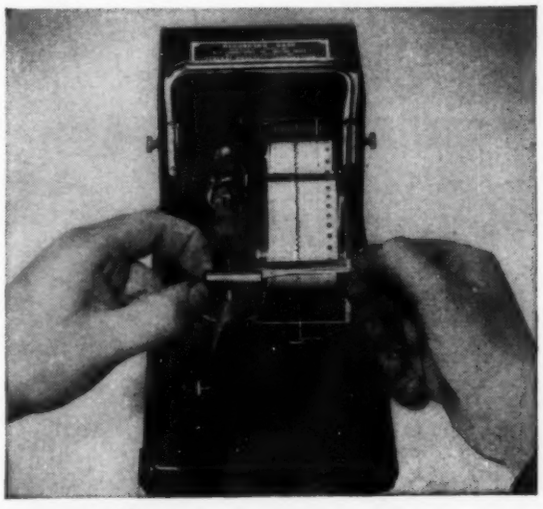
*The use of Dial Indicator Gages — visible precision — lowers inspection costs, raises production. Federal Products Corporation is America's largest maker of both standard and custom-built gages — mechanical, air, electronic — for the measurement of single and multiple dimensions.

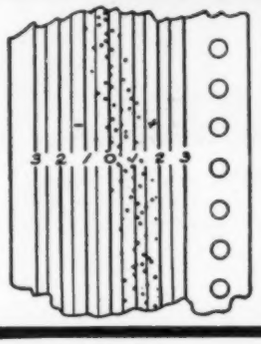
QUALITY CONTROL

reduces scrap, saves machine and man hours

Instead of inspecting workpieces *after* they are completely made . . . Statistical Quality Control—with the help of Dial Indicator Gages—samples the dimensions of workpieces as they are being made right at the machine. The findings show immediately whether the work is satisfactory—give advance warning when a machine is tending to exceed its control limits. This stitch-in-time method reduces scrap, prevents losses in machine and man hours.

The continued use of Quality Control Methods leads to sensible standardizations in product, specifications, machine methods and materials. . . . Let us give you case histories.





This record warns of a trend toward over-size

RECORD AS YOU GAGE

with this new Recording Gage

Here is a precision instrument which measures small parts—up to 1.000"—and simultaneously records in ink, on a paper chart, the deviations of the measured parts from the specified dimension. A deviation of .001" produces a change of .150" in the position of the dot on the record. This Recording Gage is easily used by an unskilled inspector. With no calculations, the operator is warned to adjust the machine before it produces parts outside of control limits. In addition, a permanent record of the dimensional quality of the workpieces is provided.

Write for illustrated Bulletin #54 to receive detailed descriptions of the above gages. Let us help you with any problem of gaging and inspection. If you will send us blueprints of work to be measured, we will gladly recommend the proper gage. No obligation is involved.

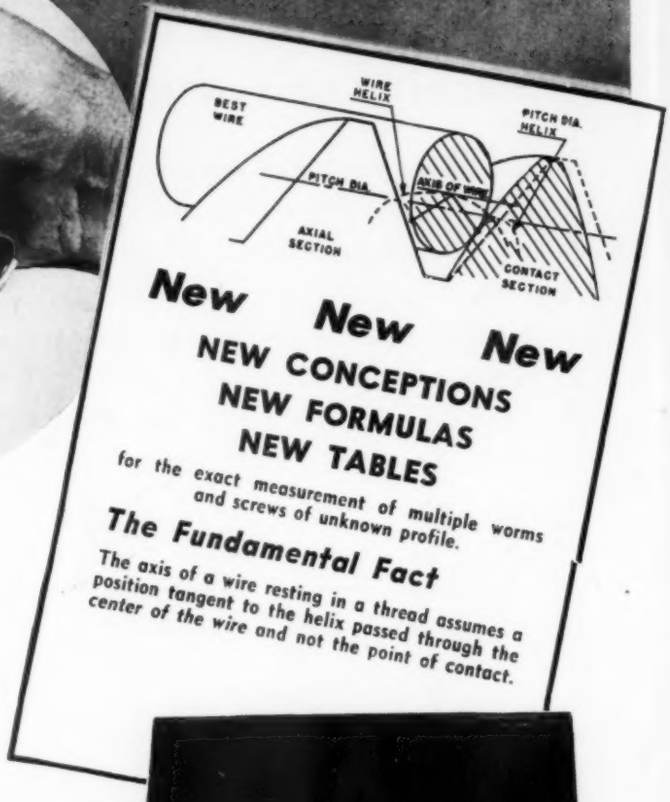
FEDERAL PRODUCTS CORPORATION **1144 Eddy St., Providence 1, R. I.**

Represented in Canada by RUDEL MACHINERY COMPANY, LTD.

Van Keuren MEASURING WIRES

STANDARD EQUIPMENT... ...everywhere

Measuring the pitch diameter of a 1"-8 National Form thread gage. This method is recommended by the Bureau of Standards.


WIRE HELIX
BEST WIRE
PITCH DIA. HELIX
PITCH DIA.
AXIAL SECTION
CONTACT SECTION
New New New
NEW CONCEPTIONS
NEW FORMULAS
NEW TABLES
for the exact measurement of multiple worms and screws of unknown profile.
The Fundamental Fact
The axis of a wire resting in a thread assumes a position tangent to the helix passed through the center of the wire and not the point of contact.

Van Keuren Measuring Wires are the accepted standard equipment for making pitch diameter measurements of taps, thread gages, precision threaded parts, hobs, worms, splines and gears. Reputable manufacturers of ground taps and thread gages used for the production and acceptance of threaded holes and nuts use Van Keuren Measuring Wires. You will seldom find them in error if you, too, have Van Keuren Measuring Wires.

The new 1948 VK Catalog and Handbook No. 34, is a 208 page manual indispensable for engineers, designers, inspectors, toolmakers and machinists. It contains simplified formulas and accurate tables for measuring spur gears, helical gears, splines and worms. New and epoch making formulas and tables are presented for the first time for the exact measurement of 29°, 40° and 60° single and multiple start screw threads and worms. It includes a complete resume of American and European screw thread systems, new methods of measuring included angle of screw threads, a new method of inspecting flat ring seal surfaces with light waves, and other valuable information. Price $1.00 each postpaid.

Set No. 20 Thread Measuring Wires is a plant necessity for maintaining taps and thread gages within their limits for wear and for proving the pitch diameter of screws and threaded parts.

Price, High Speed Steel Wires.....$ 95.00
Price, Carboloy Wires..... 240.00

Special wires from .002" to 2.000" diameter are made to any tolerance required.

THE Van Keuren CO., 176 WALTHAM STREET, WATERTOWN, MASS.

29th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

Butterfield 100% Inspected Tools

PUT ACCURATE THREADING CONTINUALLY ON TAP

in your plant

Accurate tapped holes help speed production because screws, bolts and studs can be driven in faster, more smoothly, with better holding qualities.

To insure accurate, uniform taps, Butterfield inspects *every* tap to be certain it's up to specifications. No hit or miss . . . job lot . . . or statistical inspection will do — *only 100% inspection can make quality certain.*

You can get Butterfield taps at a nearby distributor. He'll give you good service and recommend the right tap for the job you have in mind.

BUTTERFIELD DIVISION,
Union Twist Drill Co.,
Derby Line, Vermont, and
Rock Island, Quebec.

Checking Thread Form and Lead on a Hartness Comparator. Magnification 62½ diameters.

BUTTERFIELD
THE 100% INSPECTED TOOLS
Every Tool Individually Inspected
TAPS • DIES • REAMERS • SCREW PLATES

MARVEL *HAS the edge*

MARVEL High-Speed-Edge Blades assure Faster, more Accurate cutting with proven Economy and complete Safety. Only the MARVEL is a composite blade with a genuine 18% Tungsten high-speed steel cutting edge electrically welded to an exceptionally tough, strong alloy steel body.

The High-Speed-Edge does the cutting while the alloy back with hardened eyes, carries the load. Blade tensions up to 300% higher than those possible with ordinary blades are recommended. This greater tension is confined to the cutting or leading edge by the location of pin holes (exclusive MARVEL design feature) and cannot be overcome by work resistance. Heavier feeds and greater speeds are practical without "run out."

With greater accuracy, higher production, and lower cost per cut, come the extra dividend of Safety, for MARVEL High-Speed-Edge Hack Saw Blades are Positively Unbreakable—they will not shatter.

Ask your local MARVEL distributor (see classified phone book) to help you modernize your metal sawing with MARVEL High-Speed-Edge Blades. They cost no more than ordinary high-speed steel blades.

1. Genuine 18% Tungsten High-Speed Steel cutting edge.

2. Tough unbreakable alloy steel body with hardened eyes.

1. & 2. Integrally welded to make a fast-cutting, long lasting composite blade that is positively unbreakable.

ARMSTRONG-BLUM MFG. COMPANY

"THE HACK SAW PEOPLE"

5700 BLOOMINGDALE AVENUE CHICAGO 39, U. S. A.

MARVEL *Metal Cutting* SAWS

Better Machines—Better Blades

CAN YOU COMPETE AGAINST THREAD PRODUCTION LIKE... *this*

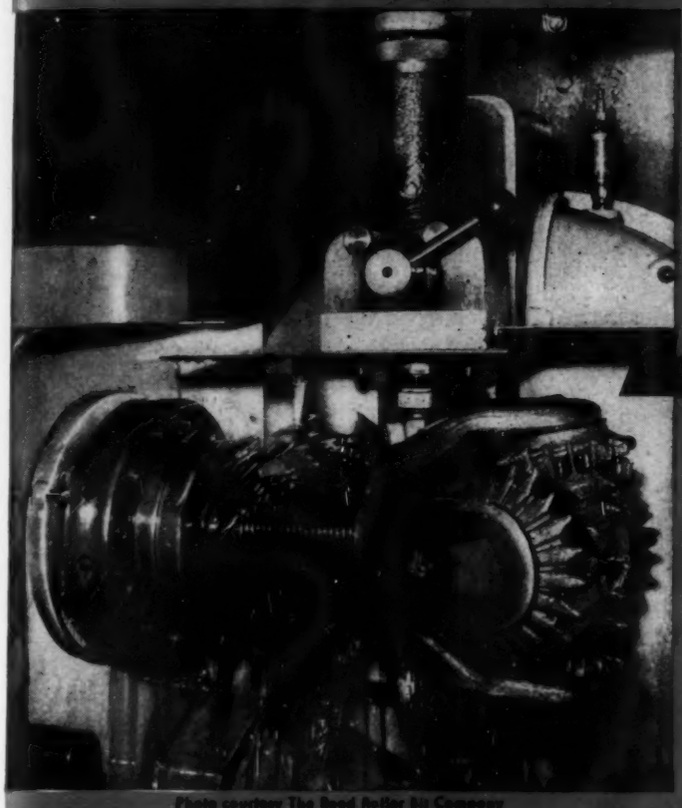
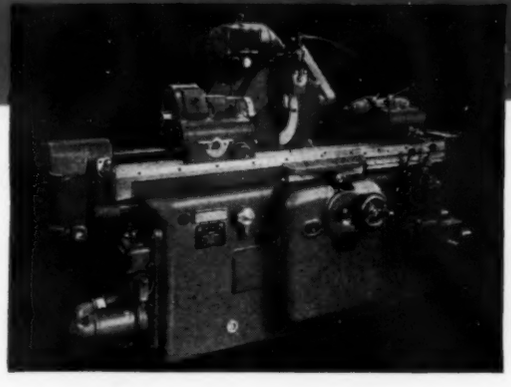


Photo courtesy The Reed Roller Bit Company



This 4 inch diameter, 4 pitch A.P.I. special form tapered thread, 5½ inches long, is ground from solid SAE-4815 Electric Weld forging in 4½ minutes!

This outstanding production on a really tough threading job is obtained on a Jones & Lamson 12x45 Automatic Thread Grinder. *The three-rib wheel removes approximately 1 pound of metal, in one pass.*

Jones & Lamson Automatic Thread Grinders guarantee you the highest production of fine quality threads in even the toughest, hardest materials. They can reduce not only your direct threading costs, but can reduce costs all along the line.

- They reduce handling costs
- They eliminate costly rethreading after heat treatment
- They eliminate expensive retooling when specifications change
- They reduce the cost of gage maintenance

Let a Jones & Lamson engineer study your threading operations. He will be able to make recommendations that will improve your profit picture. He has for others.

JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U. S. A.

Manufacturer of: Universal Turret Lathes · Fay Automatic Lathes · Automatic Double-End Milling and Centering Machines · Automatic Thread Grinders · Optical Comparators · Automatic Opening Threading Dies and Chasers · Ground Thread Flat Rolling Dies

Jones & Lamson
AUTOMATIC THREAD GRINDERS

How to pick *safe* speeds for carbide burs: use the half-million trick!

If your carbide burs chip their flutes, you probably are using the wrong driving speed. Here is a simple, easy way to cure it.

Pratt & Whitney tests . . . over a two-year period . . . have proved that correct carbide bur speeds have nothing to do with the bur's size. *It all depends on the number of flutes.* That number is etched on the shank of every P&W Keller Carbide Bur.

All you do is divide the number of flutes into half a million to find the *minimum* recommended speed in R.P.M. Just glance at the flute number on the shank, do one easy division, and you *know* the speed you must stay above to avoid flute chipping. Simple, isn't it?

All P&W Keller Carbide Burs are "center fluted". That means they have the same number of flutes over the whole bur length, regardless of its shape. Each flute is *machine ground* from the solid . . . a precision job.

P&W Keller Carbide Burs are the finest made. For all information about the various shapes and cuts, write to

PRATT & WHITNEY
***Division* Niles-Bement-Pond Company**
West Hartford 1, Conn.

Take advantage of our bur demonstration service. If you have a burring problem on a tough material . . . send it to us. We have facilities in our West Hartford plant for duplicating your shop setup, studying your job, and submitting a thorough report. Ask the Kellerflex experts how to finish it.

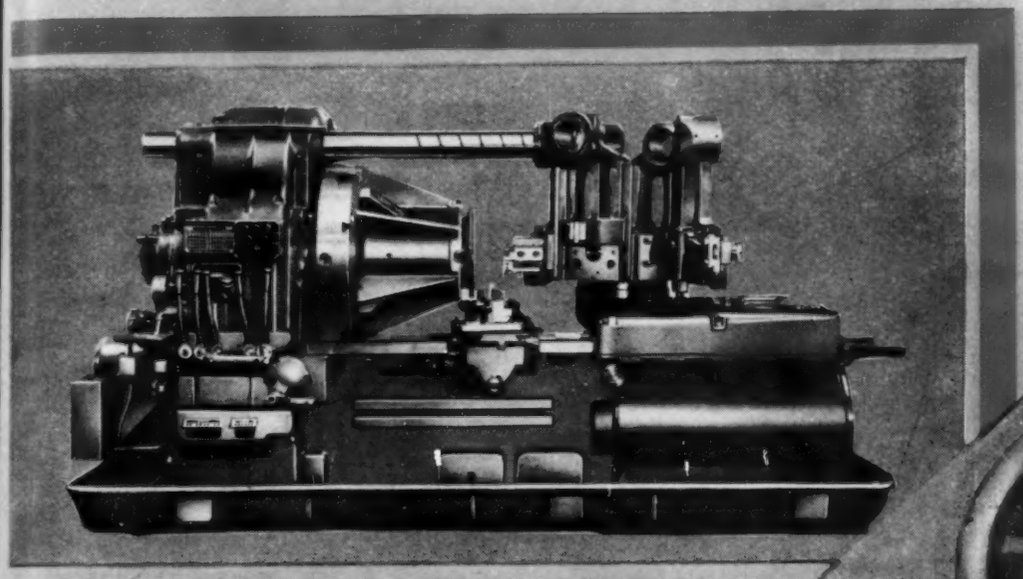
Pratt & Whitney

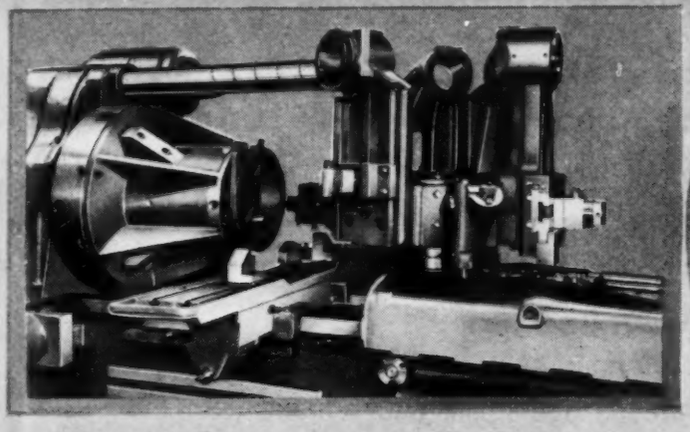
MACHINE-GROUND CENTER-FLUTED

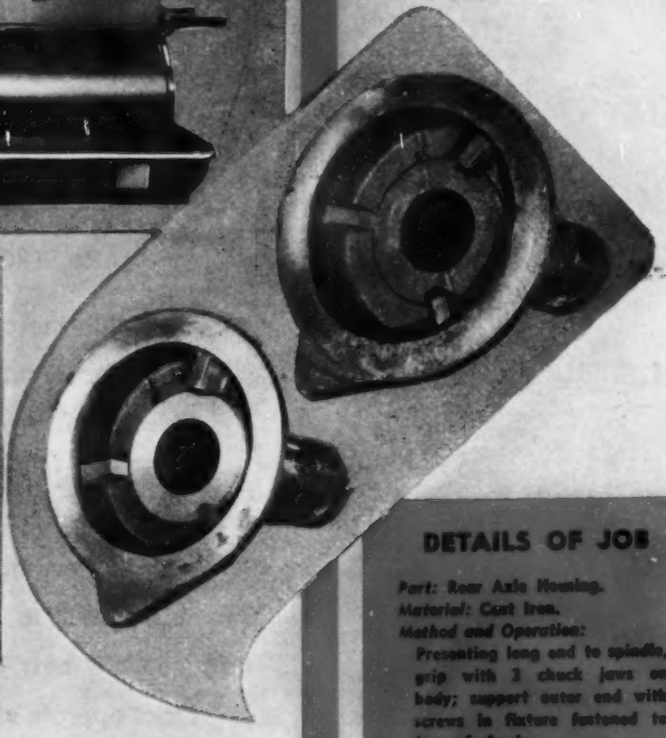
Keller Carbide Burs

"There is no better-paying investment than the right tools for the job"

Fast machining of large rear axle housings on a P&J 6 DRELX AUTOMATIC TURRET LATHE







Average Floor-To-Floor Time:

8.09 MINUTES

DETAILS OF JOB

Part: Rear Axle Housing.
Material: Cast Iron.
Method and Operation:
Presenting long end to spindle, grip with 3 chuck jaws on body; support outer end with screws in fixture fastened to face of chuck.

Machine as follows:
1st. T.F.: Rough and finish bore 8.287" dia. (two tools); spade at approx. 6¼" dia. (for slide tool); rough bore 12.750" dia.
2nd. T.F.: Rough face bottom; face flanged-divided cut (slide tool).
3rd. T.F.: Finish bore 12.750" dia., chamfer where necessary.
4th. T.F.: Finish face bottom; face flange (slide tool).
5th. T.F.: Machine 45° angular recess.
6th. T.F.: Size bore 12.750" dia.

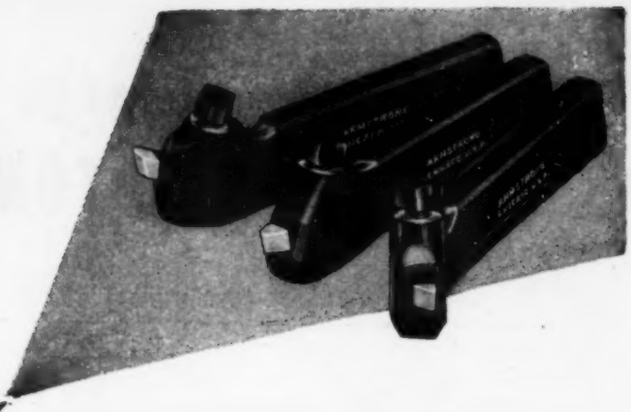
A LARGE subject is involved in this case study, yet one operator could easily handle three machine units with less fatigue than that imposed by doing the same work on one hand operated machine of equivalent capacity.

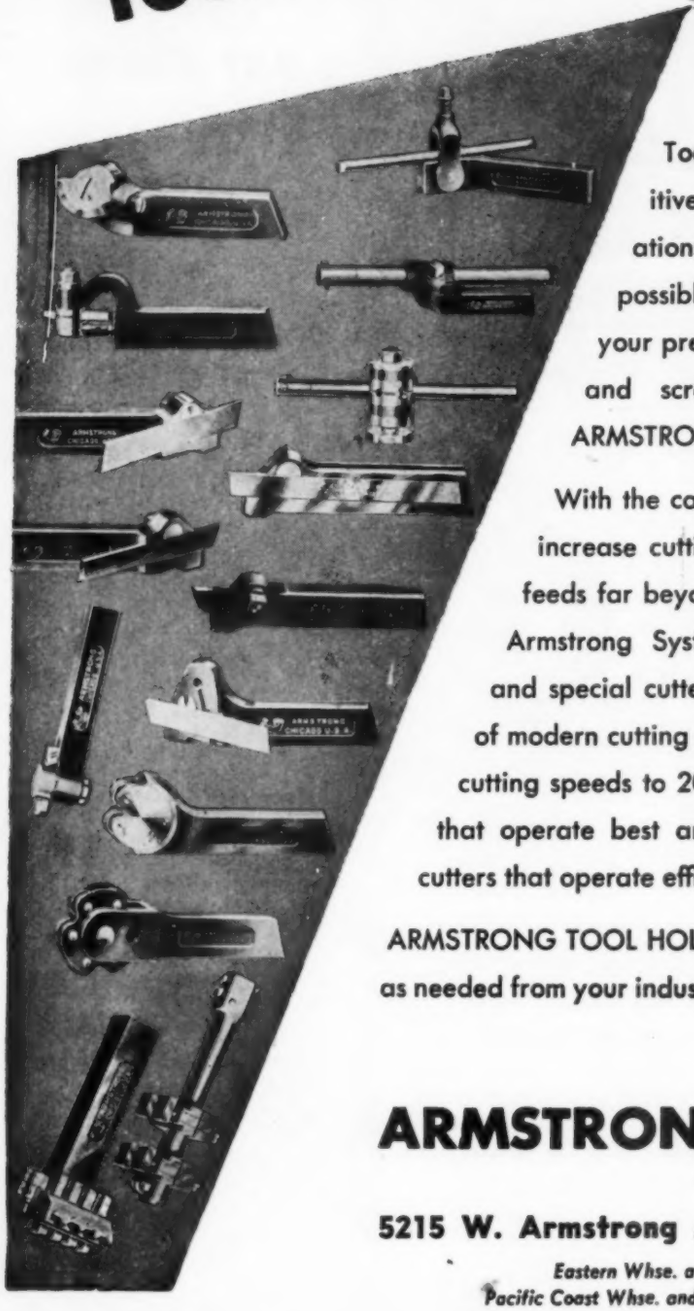
Special tooling on this P&J 6 DRELX Automatic Turret Lathe is designed to perform the machining operations on the large rear axle housing at one setting of the work. Very fast floor-to-floor time (averaging 8.09 minutes per piece), again proves the efficiency and the cost-cutting potential of P&J machines.

Whether your production requirements call for the handling of large or small work, it will be to your advantage to consult P&J Methods Engineers to determine the savings possible on P&J Automatic Turret Lathes tooled for the job.

POTTER & JOHNSTON COMPANY
PAWTUCKET, RHODE ISLAND
Subsidiary of
Pratt & Whitney
division Niles-Bement-Pond Company

ARMSTRONG TOOL HOLDERS





Produce more at lower cost with ARMSTRONG TOOL HOLDERS

Today's problem of producing more without prohibitive costs is easily answered on many machining operations by the Armstrong System of Tool Holders. It is possible to materially increase output per man hour on your present lathes, planers, slotters, shapers, turret lathes and screw machines, by simply using the correct ARMSTRONG TOOL HOLDER for each operation.

With the correct ARMSTRONG TOOL HOLDERS you not only increase cutting efficiency but can safely step up speeds and feeds far beyond those ordinarily used. Included in the modern Armstrong System are special ARMSTRONG TOOL HOLDERS and special cutter bits and blades that cover the complete range of modern cutting speeds. ARMSTRONG HIGH SPEED cutters for all cutting speeds to 200 f.p.m., ARMALOY (Cast alloy) Bits and Blades that operate best around 300 f.p.m. and ARMIDE (carbide-tipped) cutters that operate efficiently at rates as high as 600 f.p.m.

ARMSTRONG TOOL HOLDERS, Bits, Blades and Cutters, can be picked up as needed from your industrial distributor.

Write for Catalog

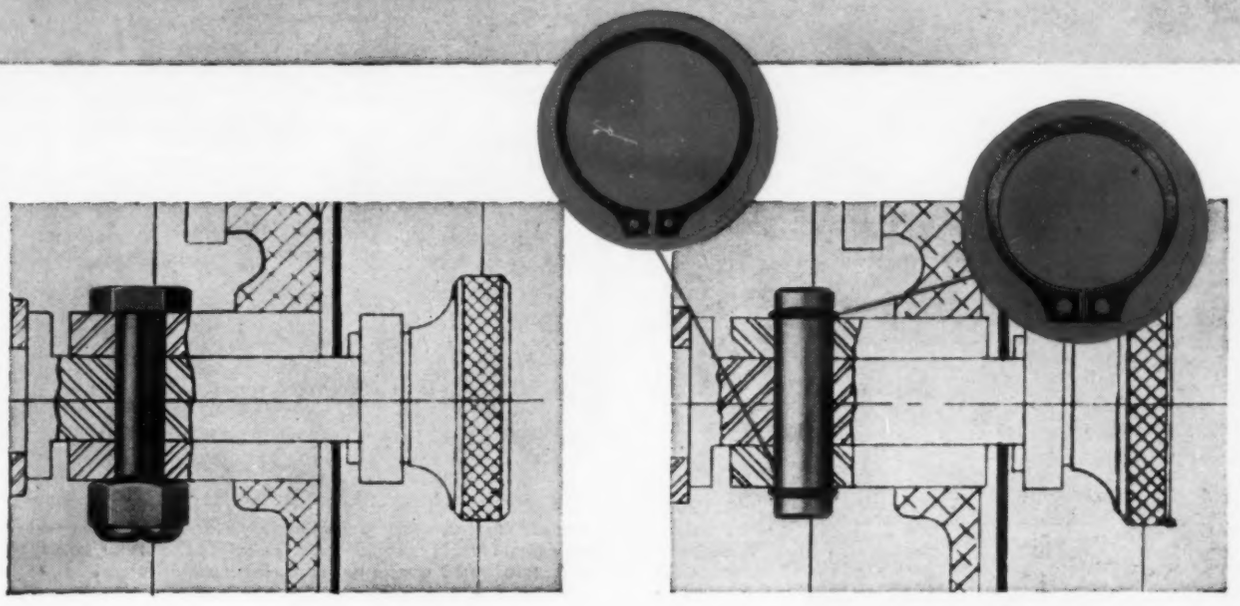
ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

5215 W. Armstrong Ave. **Chicago 30, U. S. A.**

Eastern Whse. and Sales: 199 Lafayette St., New York 12, N. Y.
Pacific Coast Whse. and Sales Office: 1275 Mission St., San Francisco 3, Calif.

Truarc saves 5 minutes, 9 cents in materials per unit without re-design of electric sanders



OLD WAY

Special ¼" cap screw and ¼-28 fibre-insert nut holds idler arm and pulley assembly on Model A3 "Take-About" Sander, Porter-Cable Machine Company.

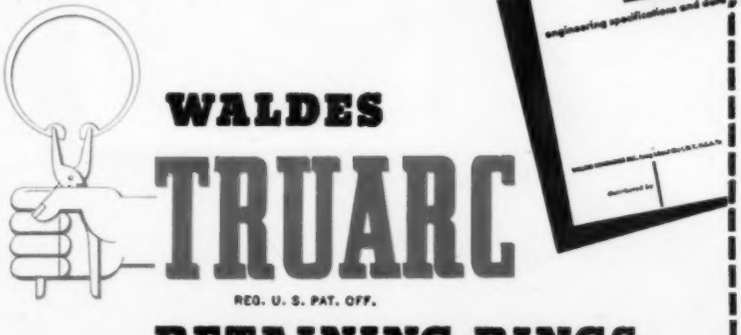
NEW WAY

Simple ¼" C.R. shaft, grooved in automatic screw machine, equipped with Waldes Truarc Retaining Rings. Bowed external ring (#5101-25) at top exerts resilient pressure taken up by Standard external ring (#5100-25) at bottom. Assembly is secure against vibration, can be easily taken apart and re-installed many times with same Truarc rings.

Every sander through the production lines costs 9 cents less for materials, requires 5 minutes less labor —with just the simple change from cap screw and nut to Waldes Truarc rings by Porter-Cable Machine Company, Syracuse, New York. The change to Truarc required no new design, no alterations in castings, but just the reappraisal of old methods.

Truarc can help you cut costs and increase production, too. Wherever you use machined shoulders, nuts, bolts, snap rings, cotter pins—there's a Truarc ring that does a better job of holding parts together. All Waldes Truarc Retaining Rings are precision engineered, remain always circular to give a never-failing grip.

Send us your drawings. Waldes Truarc engineers will be glad to show how Truarc can help you.



WALDES

TRUARC

REG. U. S. PAT. OFF.

RETAINING RINGS

WALDES KOHINOOR, INC., LONG ISLAND CITY 1, NEW YORK

WALDES TRUARC RETAINING RINGS ARE PROTECTED BY U. S. PATS. 2,302,948; 2,026,454; 2,416,852 AND OTHER PATS. PEND.

Waldes Kohinoor, Inc., 47-10 Austel Place AM10
Long Island City 1, N. Y.

Please send 28-page Data Book on Waldes Truarc Retaining Rings.

Name_____

Title_____

Company_____

Business Address_____

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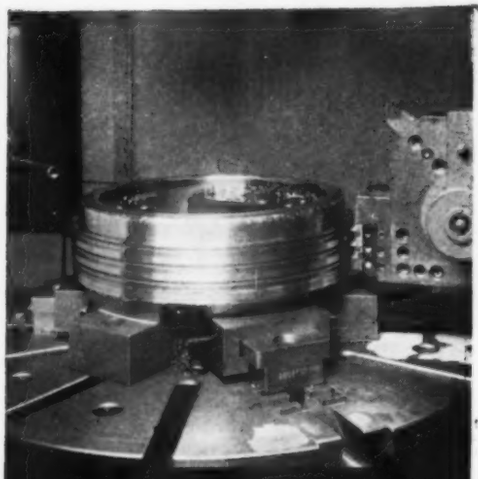
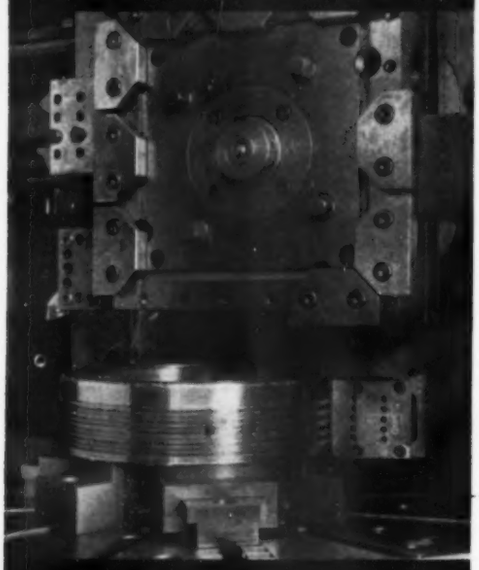
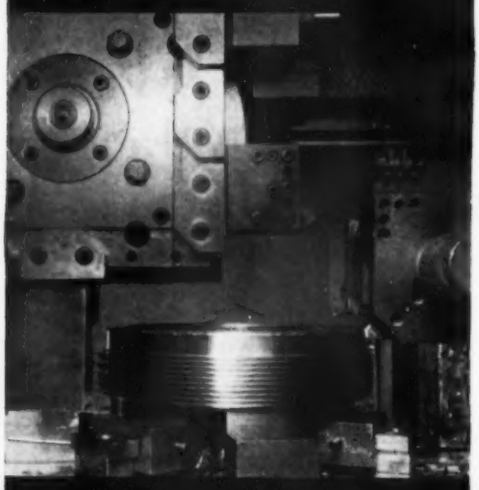


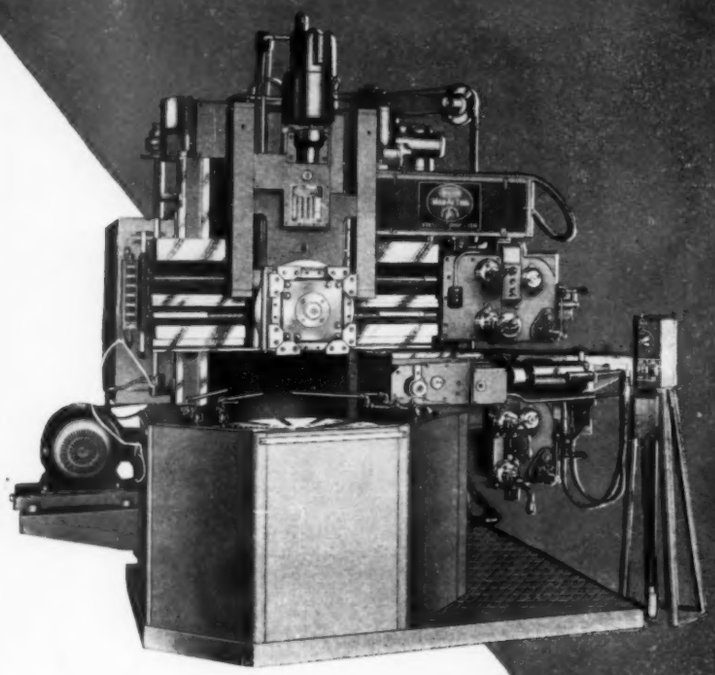
This is the first finning operation—finish turn OD of fins and semi-finish turn shoulder diameter—face flange and form shoulder radius and rough cut fins.



Here Man-Au-Trol utilizes the angular turning attachment to generate the top surfaces of the fins. 5 cutting tools instead of 3 are working simultaneously as in the roughing operation.



This is the final finning operation—the under surfaces of the fins are generated using 5 cutters in the turret head, while side head turns the shoulder.



BULLARD 30" Man-Au-Trol Vertical Turret Lathe versatility solved a brake drum problem for Copperweld Steel Company Brake Drum Division. It reduced the machining time for their delicate finning operation from 80 minutes per drum for the only previously successful method to 18 minutes per drum. The Man-Au-Trol method not only successfully provided a finning method, but also took additional cuts not previously possible without additional set-ups.

Several of the Man-Au-Trol functions are pictured and described on the accompanying close-ups.

BULLARD MAN-AU-TROL PRODUCES UNIQUE *Copperweld* BRAKE DRUMS MORE THAN 4½ TIMES FASTER

You, too, can set new production records with BULLARD Man-Au-Trol Vertical Turret Lathes. No other machine combines productivity, versatility and accuracy on such a lavish scale. Bulletin MAV-G-1 proves it. Write for your copy today. THE BULLARD COMPANY, Bridgeport 2, Connecticut.

BULLARD
MAN-AU-TROL
MASTER OF THE MACHINE

no other twist drill will outperform a UNION

contact your local distributor

UNION TWIST DRILL COMPANY, ATHOL, MASSACHUSETTS

MILLING CUTTERS • GEAR CUTTERS • TWIST DRILLS • HOBS • REAMERS • CARBIDE TOOLS

We own and operate S. W. CARD MANUFACTURING CO., Division, Mansfield, Mass.

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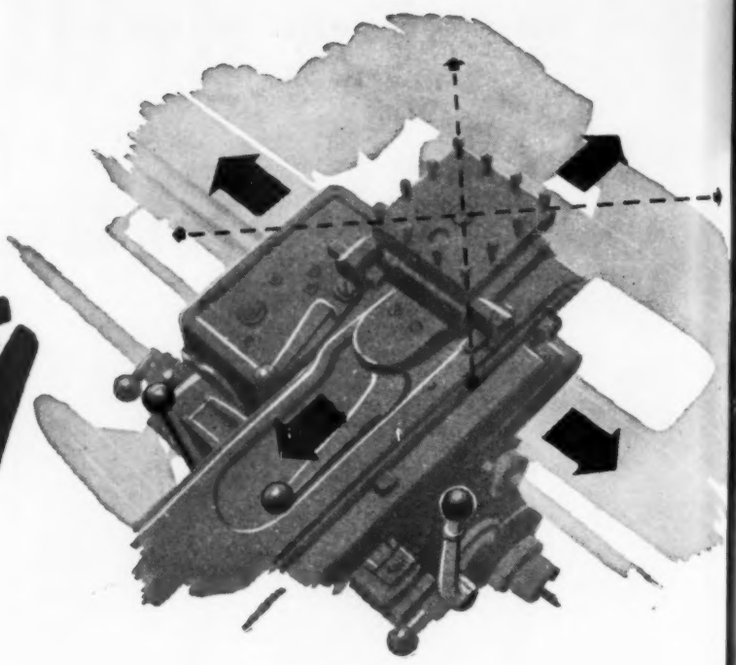
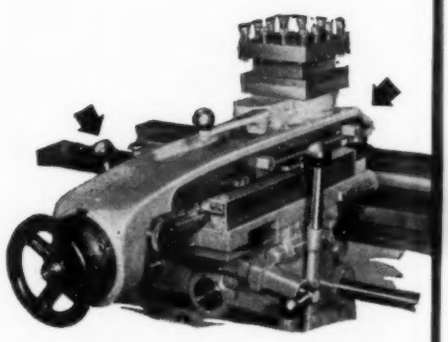
GISHOLT Saddle Type TURRET LATHE

Exclusive Versatility

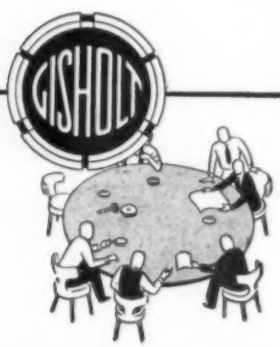


Power Rapid Traverses for side carriage and cross slide are controlled by dual levers, thus permitting them to move independently or together.



Gisholt's more versatile power rapid traverse reduces time lag between cuts, speeds production, saves time and money. *This has been a standard Gisholt feature for over twenty years.*

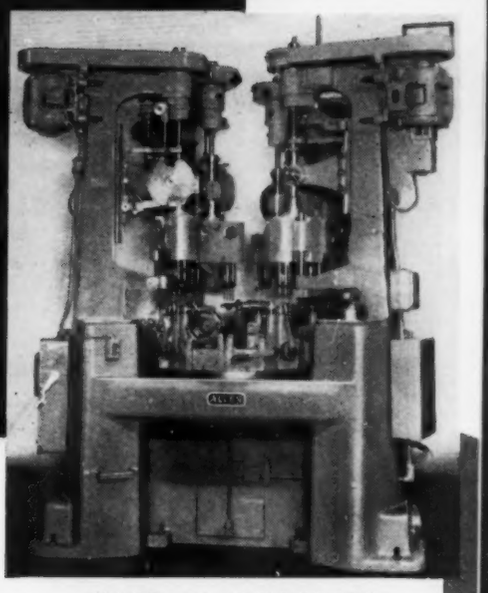
GISHOLT MACHINE COMPANY
Madison 10, Wisconsin



THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS BALANCERS • SPECIAL MACHINES

Leading Drilling Machine Builders *rely Exclusively on* U. S. DRILL HEADS

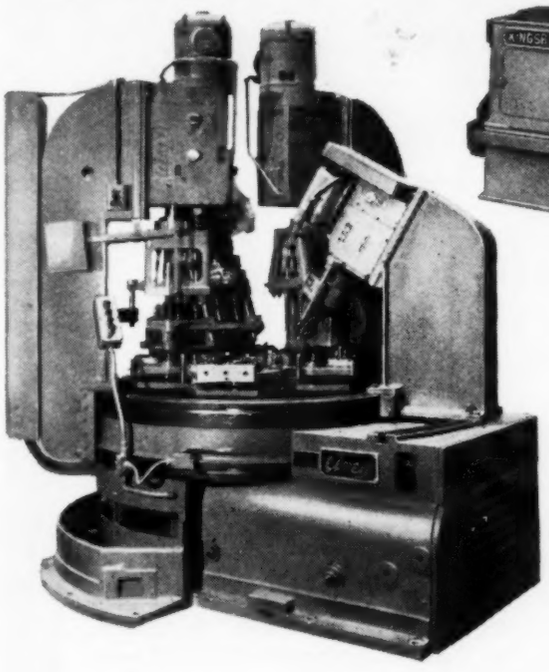


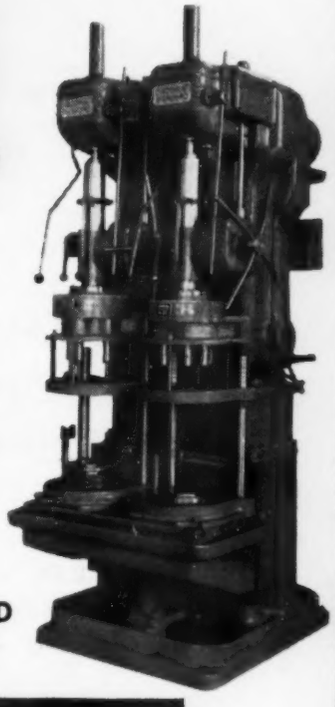
CHAS. G. ALLEN CO.

IT'S Performance Data that counts. That's why engineers insist on U. S. Drill Heads.

Write—or wire—today for latest catalog and full information on how we can help you.

KINGSBURY MACHINE TOOL CORP.





WE manufacture all types of multiple spindle, fixed center, adjustable and lead screw tapping heads.

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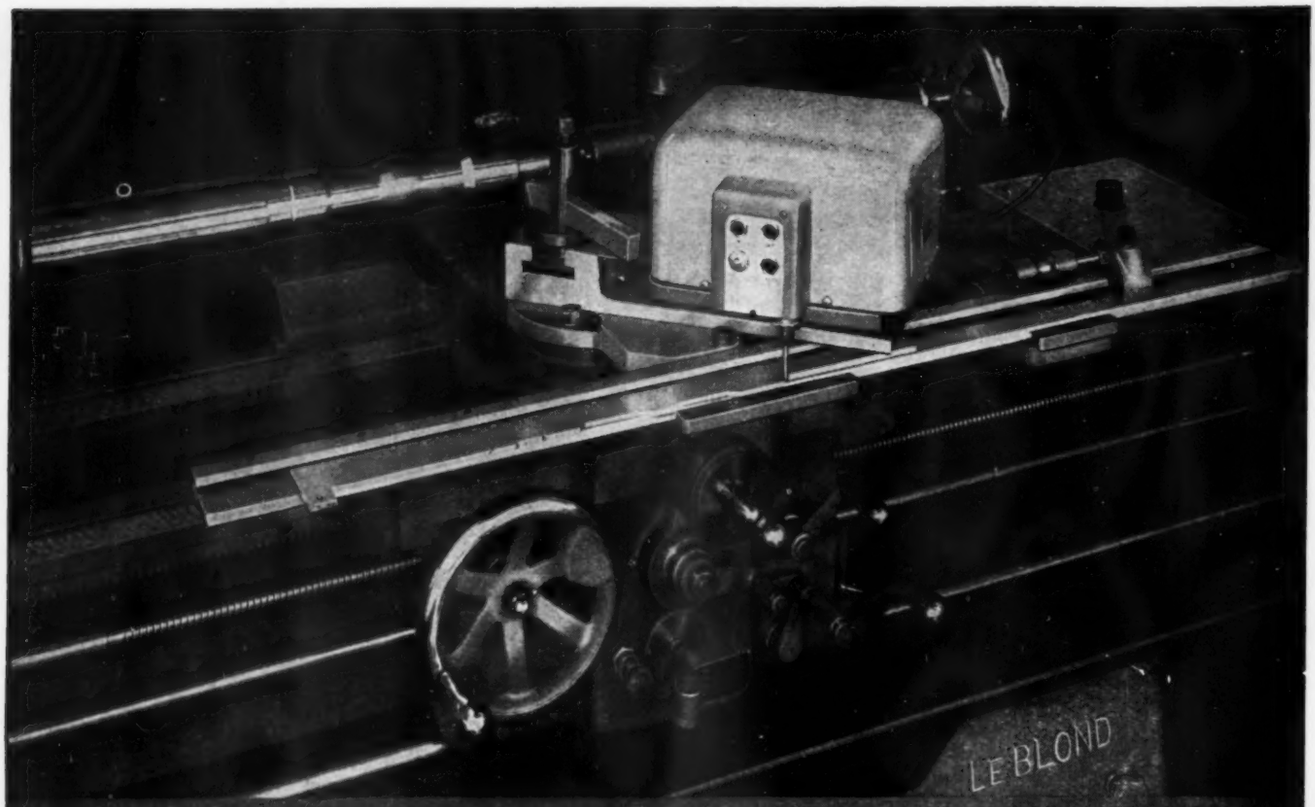
AVEY DRILLING MACHINE CO.

CLEVELAND TAPPING MACHINE CO.

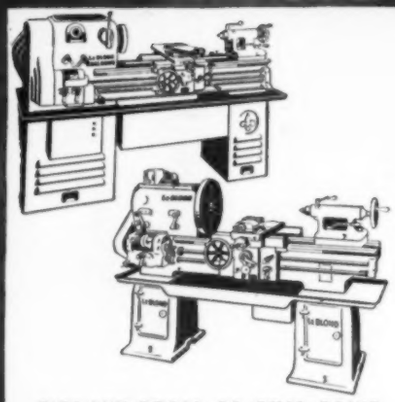
US HEADS SINCE 1915

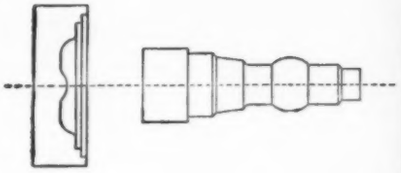
UNITED STATES DRILL HEAD CO.

CINCINNATI 4, OHIO



★NEW LeBLOND ELECTRIC DUPLICATING ATTACHMENT





FITS ANY REGAL OR DUAL DRIVE

You can install the new LeBlond Electric Duplicator in 10 minutes time without drilling or fitting. It's available for any Regal or Dual Drive, any size, anywhere. Operates on the template-tracer principle, and is controlled by electric push buttons for "in", "out", and "automatic". No special skill is required to operate or set it up.

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You can put your new duplicator right to work, because no complicated wiring is necessary. It comes equipped with regular plug which can be snapped quickly into the nearest light socket for 110/115 volt 50 or 60 cycle single phase service. The LeBlond electric duplicator is easy to install, easy to use, and just as easy to remove.

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Duplicates profile facing or work between centers within .0015" to .002". On shaft work you can run this new device through every duplicating operation—straight facing and turning, tapers, shoulders, necking, concave, convex, and spherical surfaces—with one cutting tool, and without resetting. It's a time and labor saver in every respect.

No other duplicator offers you so many advantages. For further information write for illustrated bulletin today. Write Dept. EC-I, The R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

LeBLOND

your M.E.* can point the way to SALES APPEAL!

Find that M.E. in your design department—let him put his Magnesium Enthusiasm to work for you—for a big plus in sales appeal—perhaps the biggest jump on competition you've ever enjoyed!

Strong, high-quality American Magnesium Castings will give your product a lift! They're one fourth the weight of iron, only two thirds the weight of aluminum. Sand, permanent and semi-permanent mold and die castings, as well as forgings and extrusions, are available on dependable delivery schedules in the quantities you need for full production.

Encourage your M.E.! Or, if you haven't one in your shop, we'll be glad to send one of ours. ALUMINUM COMPANY OF AMERICA, sales agent for American Magnesium Products, 1709 Gulf Building, Pittsburgh 19, Pennsylvania.

*M.E., in this case, means Magnesium Enthusiast, and Mechanical Engineer as well. He's probably young, may have joined you since the war. He knows from experience the powerful appeal of American Magnesium parts: castings 75% lighter than iron, 35% lighter than aluminum. He knows the economics of magnesium which makes his recommendations practical.

MAGNESIUM MAZLO Reg. U.S. Pat. Off. PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA

A *New* STEP FORWARD IN HOBBING

BARBER COLMAN

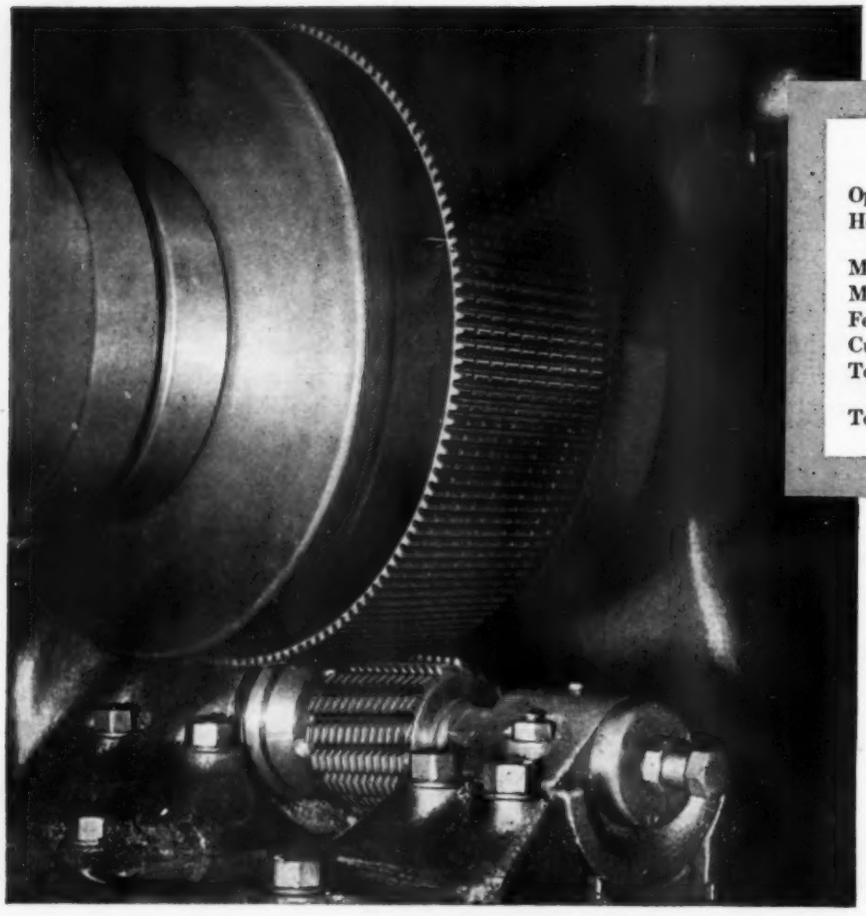
"MULTITHREAD" HOBS

● A multiple thread tool, producing pre-finishing tolerances, has now been perfected by Barber-Colman Engineers.

Where machine conditions are right, and the tolerances are adaptable, Barber-Colman "*Multithread*" Hobs show substantial increases in production, using existing machines. The flywheel ring gears shown below, for example, are cut, ten per load, in 24 minutes, or 2½ minutes per gear. Hob life is excellent — 11,000 gears per hob. Instead of the usual single lead, these new tools have several threads. Consequently, the work indexes faster, at a speed which is in direct ratio to the number of threads in the hob. Production time is reduced accordingly. As a result of production gains possible with Barber-Colman "*Multithread*" Hobs, a fewer number of hobbing machines are required to complement finish shaving or grinding equipment. These hobs are recommended only on the basis of a comprehensive analysis of the job factors in individual plants. Therefore, we suggest that you ask a Barber-Colman Representative to call.

Barber-Colman Company

GENERAL OFFICES AND PLANT 116 LOOMIS ST., ROCKFORD, ILLINOIS, U.S.A.

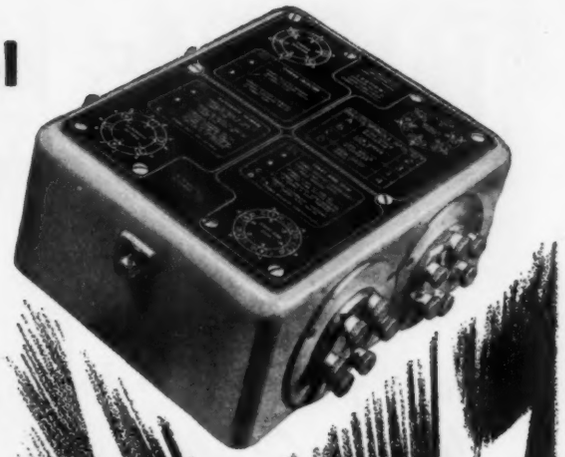


JOB FACTS

Operation—Climb Hob Ring Gears
Hob—Barber-Colman Unground "*Multithread*" hobs
Machine—Barber-Colman No. 14-15
Material—SAE 1050, R.C. 46-52
Feed—.30"/min. Speed—98 RPM
Cutting Time—25 min., load of 10 blanks
Tool life—11,000 gears per hob, former life 4200 gears per hob
Tolerance—±.0025" over pins

MODERN MACHINES DEMAND *Modern* CUTTING TOOLS — BARBER COLMAN

New *Electro-Cycle* Control for *Faster, Easier* Turning of All Metals

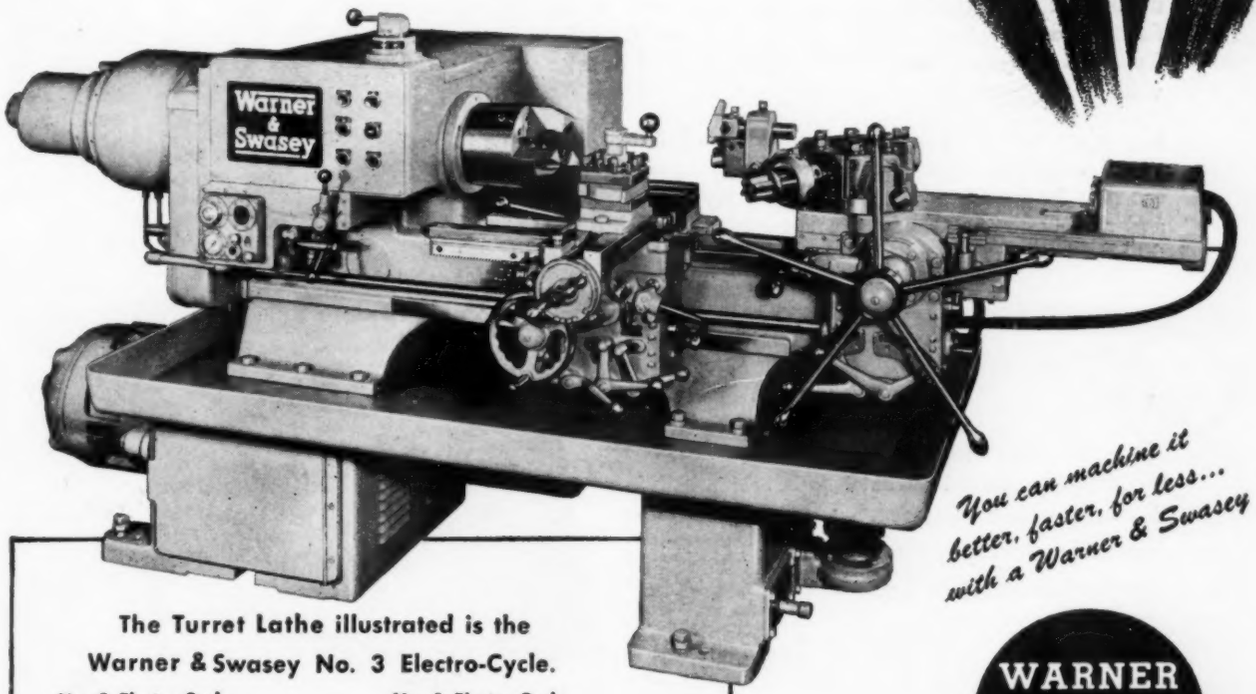


MOST of the time-taking, tiring manual operations are eliminated for the turret lathe operator when the Electro-Cycle control takes over.

This automatic control directs the functioning of the spindle for each hex turret face. Spindle start, direction of rotation, speed changes, reversal and stop, and positioning for ease in loading are all automatically controlled.

First introduced for machining non-ferrous materials, the Electro-Cycle principle is delivering big production increases in non-ferrous shops. Now the same principle is available in the new Warner & Swasey No. 2 and No. 3 Electro-Cycle Turret Lathes for faster, more profitable turning of all metals.

After studying your jobs, a Warner & Swasey field man can tell you if the Electro-Cycle machines fit into your operation. Better look into it—now!



You can machine it better, faster, for less... with a Warner & Swasey

The Turret Lathe illustrated is the Warner & Swasey No. 3 Electro-Cycle.

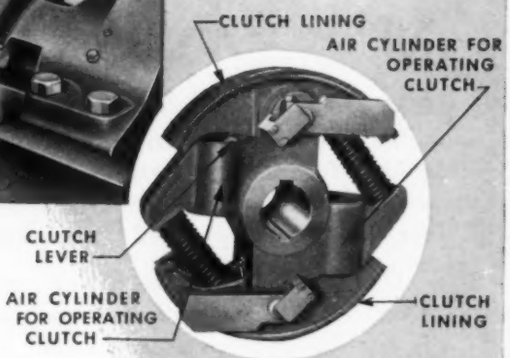
No. 2 Electro-Cycle	No. 3 Electro-Cycle
1" Bar Capacity	1½" Bar Capacity
14" Chucking Swing	15⅜" Chucking Swing
Four quick change 4-speed drives from 105 to 3600 R.P.M.	Six quick change 4-speed drives from 85 to 2500 R.P.M.

WARNER & SWASEY
Cleveland

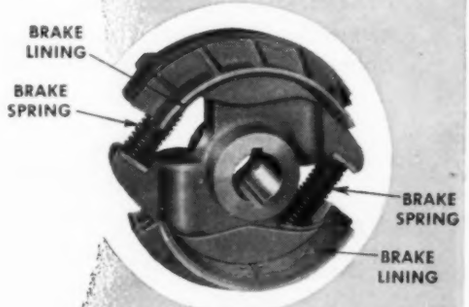
TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

CLEVELAND DRUM TYPE FRICTION CLUTCH and BRAKE

Fewer Parts
Lighter Weight
Less Down Time
Greater Efficiency



ABOUT HALF THE NUMBER OF PARTS USED IN A CONVENTIONAL DISK TYPE FRICTION CLUTCH



APPROXIMATELY ONE FOURTH THE WEIGHT OF A CONVENTIONAL DISK FRICTION CLUTCH OF EQUAL CAPACITY

Men engaged in the Pressed Metal Industry who are responsible for keeping parts "flowing" in a constant and steady "stream", have—after seeing this (patented) Cleveland Drum Type Clutch and Brake repeatedly and intentionally abused, without damage to either the Clutch or the Press—acclaimed it as one of the most outstanding contributions to uninterrupted production yet developed.

They have learned from personal observation that not only is this Cleveland Clutch designed to provide full Clutch or full Brake, without drag, but that the reduction in weight and the minimum number of parts used in its construction contribute to more efficient and more economical operation, as the Cleveland Drum Type Clutch requires considerably less power to operate yet provides quicker starting and stopping.

If you are interested in obtaining additional information on this Cleveland Drum Type Clutch with Spring Operated Brake, which can now be furnished for practically every type, size and make of Press, write for a copy of our Clutch folder, or if convenient

An Invitation...

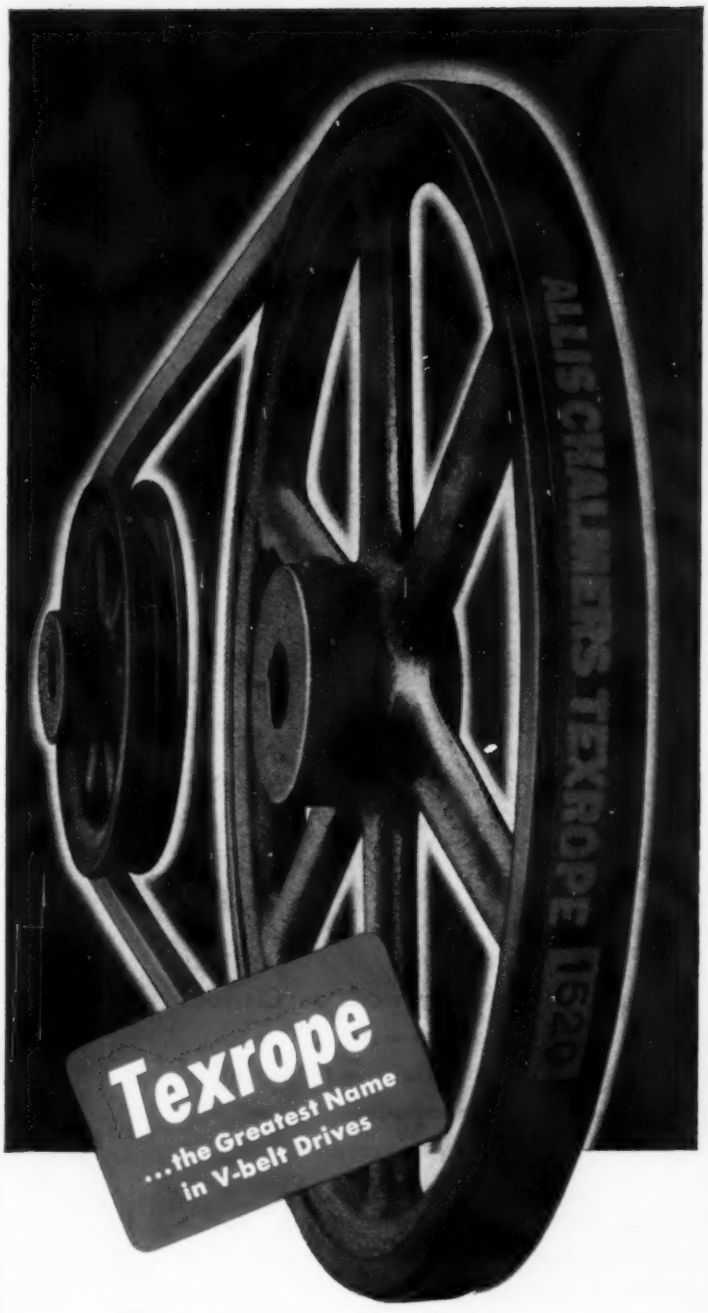
We cordially invite you to visit our Booth No. 1733 at the Metal Congress and Exhibition, to be held in Philadelphia, October 25th to 29th, where this Cleveland (patented) Drum Type Friction Clutch will be demonstrated on both a Flywheel Type and a Geared Type Press.

THE CLEVELAND PUNCH & SHEAR WORKS CO.

District Offices
NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

Cleveland 14, Ohio

TEXROPE F/HP Drives



- **"ENGINEERED" FOR INDUSTRY!**
- **AVAILABLE NOW!**
- **CARRY THE NAME "TEXROPE"... AND OVER 25 YEARS OF EXPERIENCE!**

IF YOU'RE IN THE MARKET for fractional horsepower V-belt drives, here are good reasons for investing in TEXROPE — the greatest name in V-belt Drives. 1) They're "engineered" — selected and applied to suit the exact characteristics of your drive. 2) They're in stock at Authorized A-C Dealers or available promptly through A-C District Offices, and 3) They're backed by the greatest collection of V-belt drive experience and facilities of any company in this business.

TEX-IRON F/HP SHEAVES

High density cast iron. Accurately bored for easy fit with tight shaft grip. Precision grooved for non-slip power and longer belt life. Carefully balanced for vibrationless operation at all speeds.

TEXROPE F/HP V-BELTS

Best known name in V-belts. Carry full rated load with plenty of overload and shock load capacity. Molded to fit sheave groove and grip tightly without excess wear or wasted power. An ideal teammate for Tex-Iron sheaves. Highly efficient on present sheaves, too.

The complete range of Tex-Iron sheaves from 2 to 15 inches PD and Texrope V-belts to match are now available from your dealer's stock. Call him today. Texrope, Tex-Iron, Super 7, Texsteel, Magic Grip and Vari-Pitch are Allis-Chalmers Trademarks. ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2510

A Complete Range of Products		
Super-7 V-belts	5 types . . . sizes to suit every power transmission job	
Texsteel, Texdrive, Magic-Grip	Sheaves in a full range of sizes and grooves	
Vari-Pitch Sheaves	Exact variations in speed — Stationary or Motion control	
Speed Changers	Speed variations up to 375% at the turn of a crank	

SEND TODAY for Allis-Chalmers 44 page book No. 20B6249A describing Texrope F/HP V-belt drives — the Fractional Horsepower Drive that's "Engineered" for Industry. Result of years of experience in engineering FHP V-belt drives. Shows you simple, accurate way to select FHP sheaves and belts. Every FHP drive user should have a copy.

Texrope Super-7 V-belts result from the cooperative research of Allis-Chalmers and B. F. Goodrich; and are sold only by A-C dealers and offices.

ALLIS-CHALMERS

Originators of the Multiple V-belt Drive for Industry

See for yourself how CIMCOOL covers 85% of all metal cutting operations

The picture gets brighter in more plants every week as Cimcool takes over 85% of all metal cutting operations—and does a *better* job. This new kind of cutting fluid replaces all water emulsions and all but a few highly compounded specialty oils. It proves itself by improving machine performance.

Cimcool is different—a *chemical emulsion*—that combines friction reduction and cooling capacity in a degree never before attained. It increases tool life, permits faster speeds. One test run will convince you!

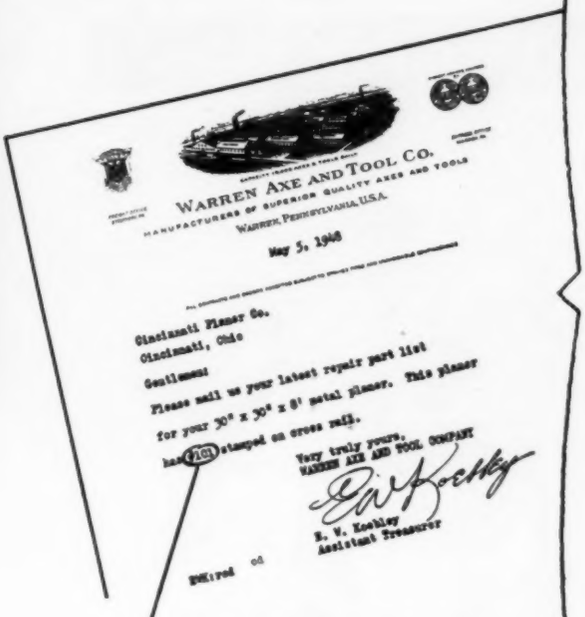
CIMCOOL DIVISION OF THE CINCINNATI MILLING MACHINE CO.,
CINCINNATI 9, OHIO, U. S. A.

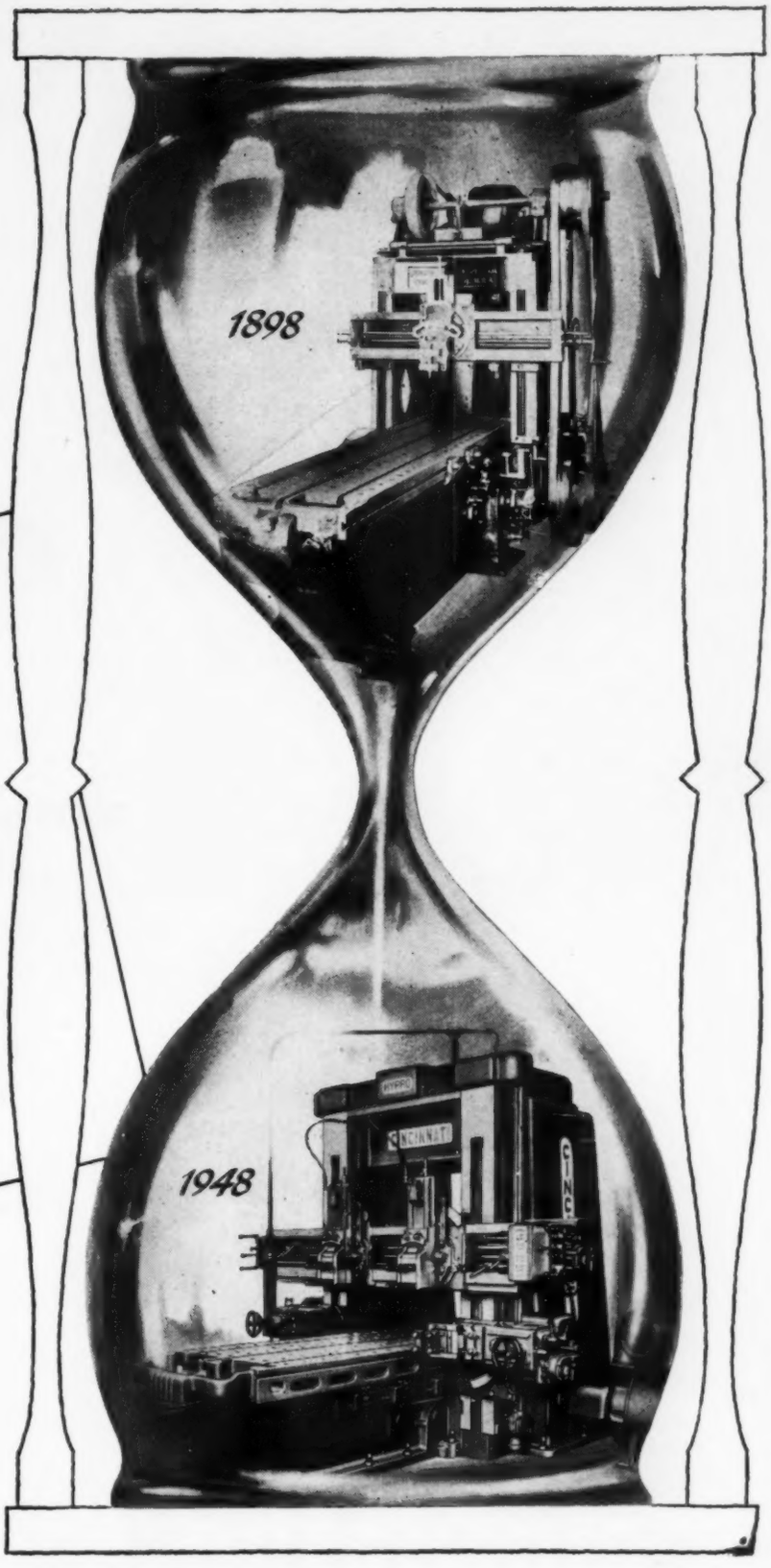
CIMCOOL *for* 85%

Trade Mark Reg. U. S. Pat. Off.

OF ALL METAL CUTTING JOB

50 years


WARREN AXE AND TOOL CO.
MANUFACTURERS OF SUPERIOR QUALITY AXES AND TOOLS
WARREN, PENNSYLVANIA, U.S.A.
May 5, 1948
Cincinnati Planer Co.
Cincinnati, Ohio
Gentlemen:
Please mail us your latest repair part list
for your 30" x 30" x 8' metal planer. This planer
has #101 stamped on cross rail.
Very truly yours,
WARREN AXE AND TOOL COMPANY
E. V. Koehler
Assistant Treasurer
EVK:rod



No. 101 was the first Planer manufactured by the Cincinnati Planer Company. They made a good Planer in 1898 of highest quality and finest workmanship which has stood the test of time.

Today we make an even better Planer. The modern Cincinnati HYPRO Planer, still retaining all of the Hypro-duction features and craftsmanship developed through years of experience, has been improved to incorporate new and exclusive features such as centralized finger-tip control for the complete operation of the machine, all steel hardened "twin" helical gear train, double nuts on both saddle and down slide screws, inverted dovetail slides, double acting tool block abutment, centralized dual saddle control and precision adjustment handles. These features provide increased production, lower planing costs and convenience to the operator.

Bulletin No. 138 will give you complete specifications. Write for it today.

THE CINCINNATI HYPRO PLANER COMPANY

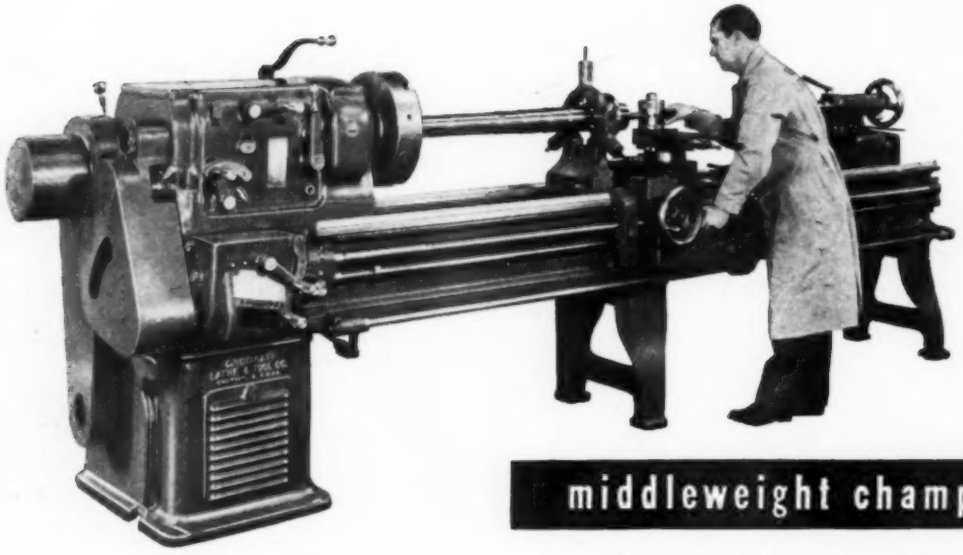
PLANERS · BORING MILLS · PLANER TYPE MILLERS

CINCINNATI, OHIO

Subsidiary of the GIDDINGS & LEWIS MACHINE TOOL CO., FOND DU LAC, WIS.

The new Traytop line of light duty geared head engine lathes (10", 12½", 15", and 18" swing sizes) offers many "high price" lathe features at truly low cost: 12 spindle speeds, selected by color-coded dial, 48 thread and feed changes, exceptionally large spindles, anti-friction bearings, double-walled apron, totally enclosed gear box, many others. Distance between centers from 18" to 60". 15" and 18" sizes can be furnished with gap and gap block. Write for Bulletin T-100.

lightweight champ



middleweight champ

In the medium duty class, the Standard line (14", 16", 18", 20", 22", and 24" nominal swings) assures you real all-around utility with exceptionally low initial investment, quickly pays for itself by efficient handling of practically all your turning, boring, and threading operations. 12 spindle speeds, 32 thread and feed changes, distance between centers from 32" to 238". All sizes available with gap and gap block. Write for Bulletin S-100.

cintilathe

OF OUTSTANDING VALUE

CINCINNATI LATHE & TOOL CO., CINCINNATI 9, OHIO

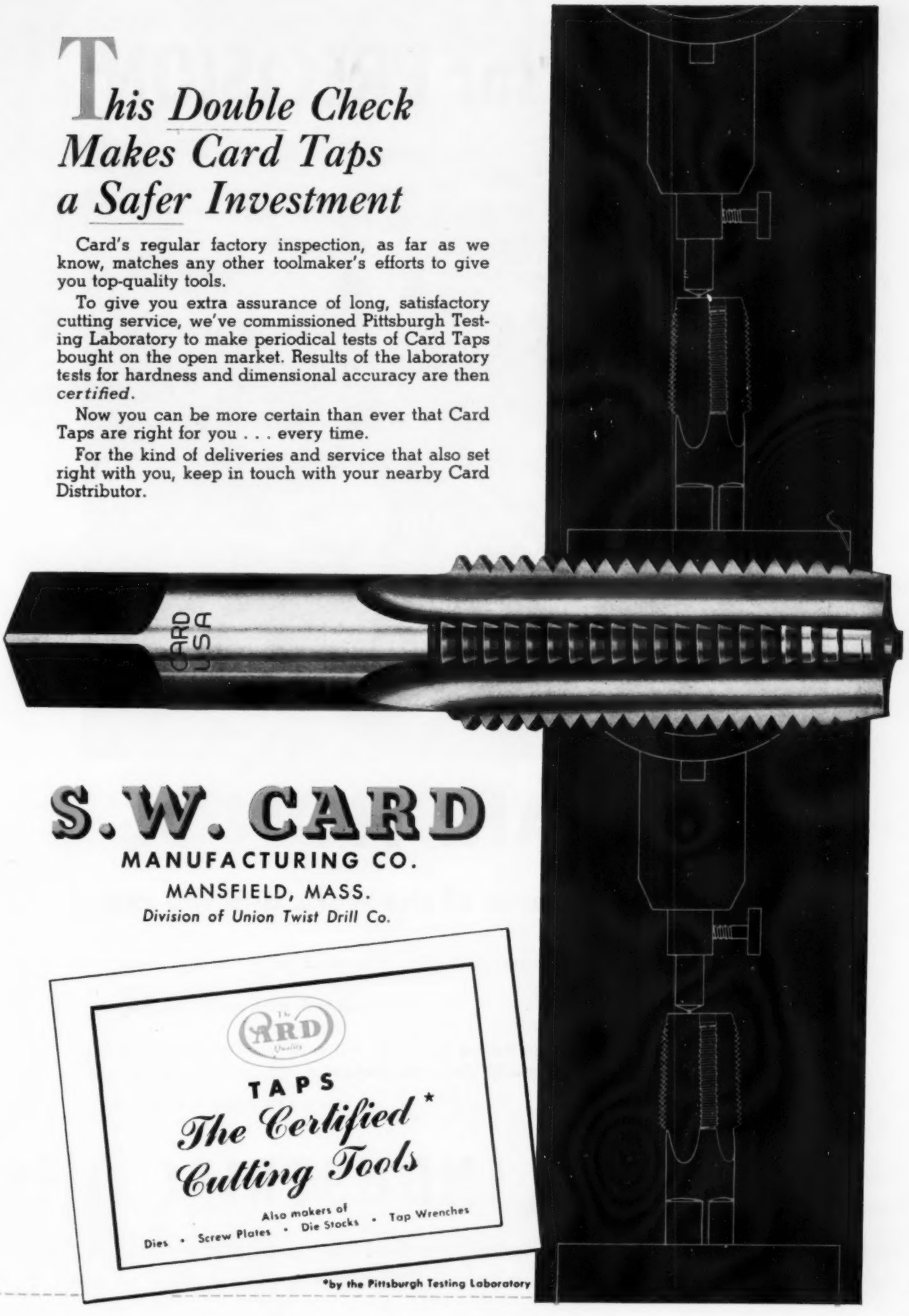
This Double Check Makes Card Taps a Safer Investment

Card's regular factory inspection, as far as we know, matches any other toolmaker's efforts to give you top-quality tools.

To give you extra assurance of long, satisfactory cutting service, we've commissioned Pittsburgh Testing Laboratory to make periodical tests of Card Taps bought on the open market. Results of the laboratory tests for hardness and dimensional accuracy are then *certified*.

Now you can be more certain than ever that Card Taps are right for you . . . every time.

For the kind of deliveries and service that also set right with you, keep in touch with your nearby Card Distributor.



S.W. CARD

MANUFACTURING CO.

MANSFIELD, MASS.

Division of Union Twist Drill Co.

TAPS

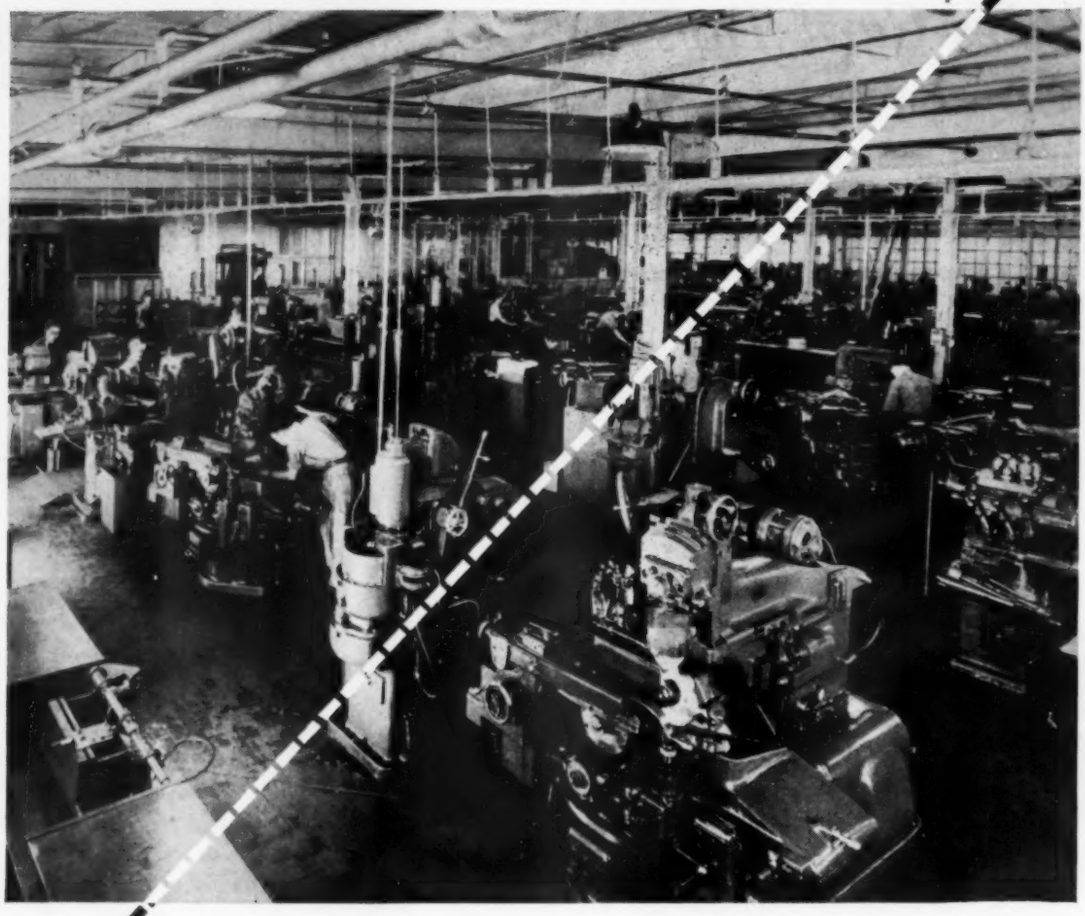
The Certified Cutting Tools*

Also makers of

Dies • Screw Plates • Die Stocks • Tap Wrenches

*by the Pittsburgh Testing Laboratory

HONING for PRECISION



SINCLAIR HONOL*

meets all requirements of the work and the metal

Choice of coolant is vitally important in honing. It is second only to the proper grit or grade of the abrasive stone.

Sinclair HONOLS are made to meet the requirements of both work and metal. They come ready for use; they need no further mixing.

Sinclair consultants, skilled in honing operations and application of appropriate coolants, are available to advise you on the proper grade of HONOL to insure precision finish and uniformity of results.

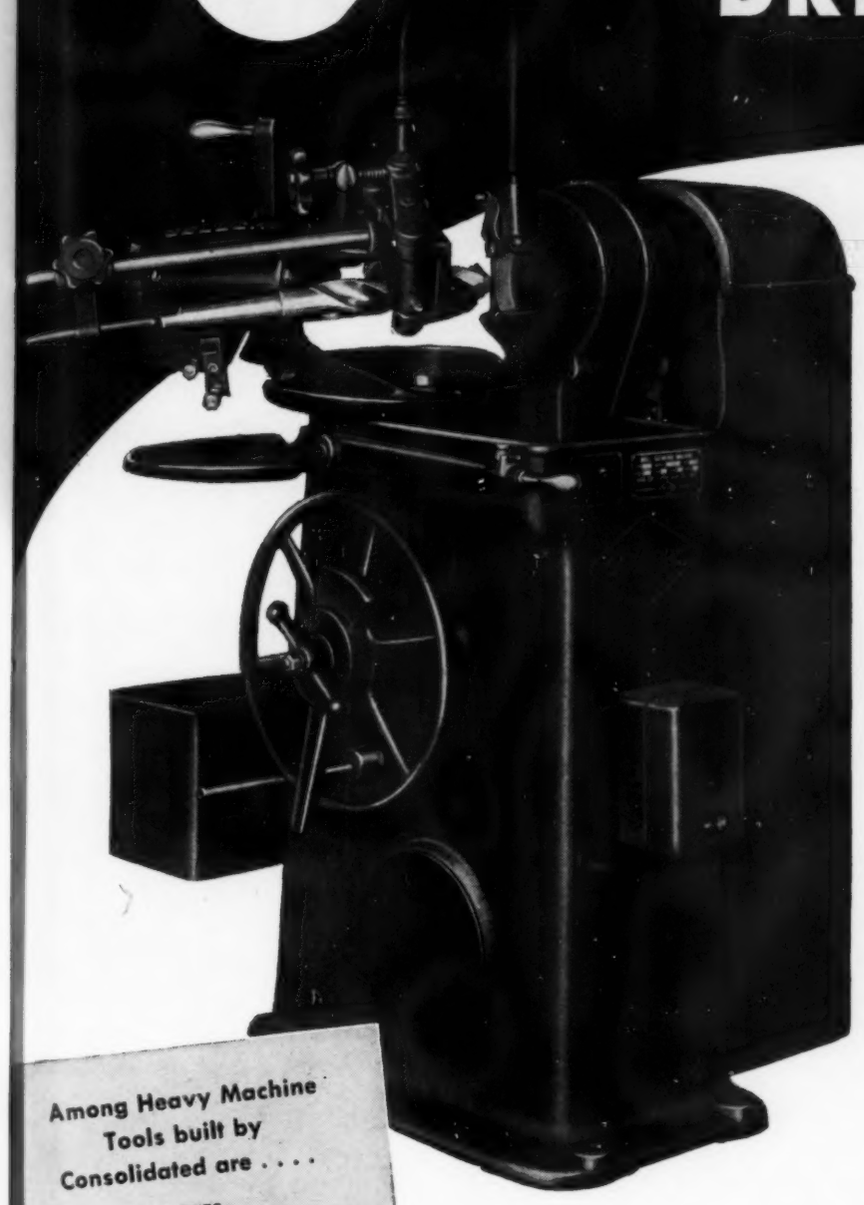
*Honing Fluid, Reg. U.S. Pat. Off.

SINCLAIR INDUSTRIAL OILS

YOUR NEAREST SINCLAIR AGENT WILL GLADLY ARRANGE FOR LUBRICATION COUNSEL, OR YOU MAY WRITE TO SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, NEW YORK

MODEL 6-G

SELLERS DRILL GRINDER



QUICKLY PAYS FOR ITSELF IN DRILL MAINTENANCE SAVINGS

- **INCREASED PRODUCTION**
  Free cutting accurate drills permit drilling machines to be operated at their most efficient speeds.
- **LONGER DRILL LIFE**
  Less drill material is ground off when re-sharpening drills.
- **MORE HOLES PER GRIND**
  Correctly ground—drills remain sharp for a greater number of holes.
- **REDUCED ASSEMBLY COSTS**
  Eliminates under- and over-size holes. Saves reaming and boring.
- **RECLAIMS DAMAGED DRILLS**
  Sellers grinding method reclaims many burned and broken drills that are ordinarily scrapped.
- **ECONOMICAL**
  This Sellers Grinder has been known to have earned its original cost as many as six times over within a single year.

Among Heavy Machine Tools built by Consolidated are . . . .

LATHES
BORING MILLS
DRILL PRESSES
MILLING MACHINES
BORING MACHINES
COLD SAW MACHINES
BORING, DRILLING AND MILLING MACHINES
DRILL AND TOOL GRINDERS
PLANERS
SLOTTERS
RAILROAD SHOP TOOLS
AUTOMOTIVE TOOLS
AND OTHER SPECIAL MACHINES

The Sellers 6-G Drill Grinder provides an improved method of grinding that produces correctly formed drill points and duplicate lips. It automatically determines proper clearance according to drill size and grinds drills to equal length for use with multiple spindle drilling machines. This method materially reduces drill maintenance costs. A wet grinder that is especially adapted to grinding high speed twist drills from ¼" to 3" diameter.

Send for complete information

BUILDERS OF HEAVY DUTY MACHINE TOOLS SINCE 1848

BETTS • BETTS-BRIDGEFORD • COLBURN • HILLES & JONES • MODERN • NEWTON • SELLERS

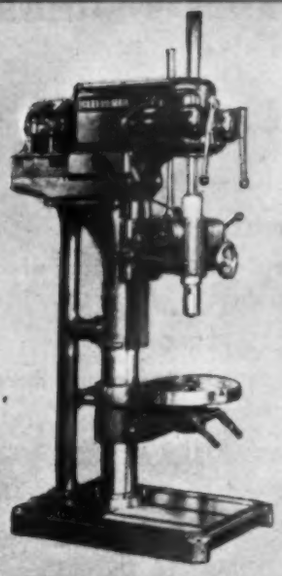
CONSOLIDATED MACHINE TOOLS

CONSOLIDATED
MACHINE TOOL CORPORATION

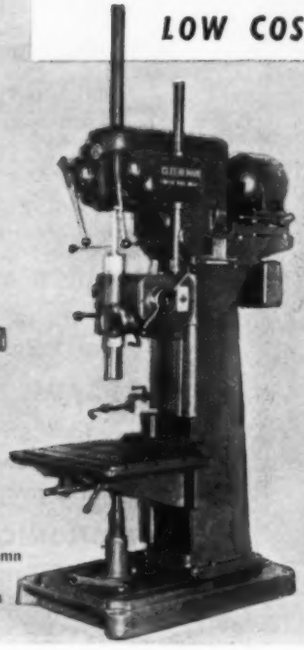
ROCHESTER 10, NEW YORK

CLEEREMAN DRILLING MACHINES

FOR SPEED — ACCURACY —ADAPTABILITY— LOW COST PRODUCTION

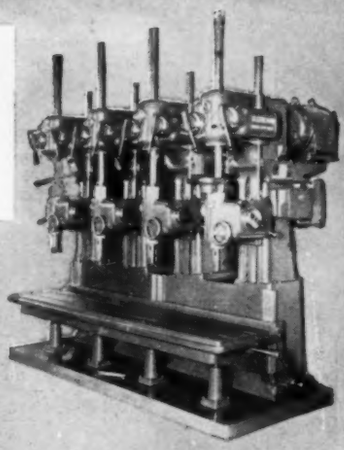


Cleereman Round Column Sliding Head Drilling Machines



Cleereman Box Column Sliding Head Drilling Machines

Cleereman No. 325 Single Unit Sliding Head Drilling Machine



Cleereman Multiple Drilling Machines

1908 - 1948 40th Anniversary CLEEREMAN MACHINE TOOL CO.

Cleereman builds a complete line of drilling machines for production work. All have won wide acceptance both here and abroad. All are noted for their high standards of performance, wide adaptability and extreme ease of operation.

The new No. 325 Single Unit Sliding Head Drilling Machine provides extreme sensitivity with rugged construction and is characterized by facility of control, exceptional flexibility and easy set-up.

Cleereman Round Column Sliding Head Drilling Machines are built in 25" and 30" sizes with a wide range of speeds and feeds. They are sturdy, precision built machines readily adapted to a wide variety of manufacturing operations.

Cleereman Box Column Sliding Head Drilling Machines in both 25" and 30" sizes have the stamina and accuracy necessary to meet the severest requirements of production work.

Cleereman Multiple Drilling Machines are available to meet individual production requirements for high speed production with accuracy and convenience.

Wire or write for Catalogs and complete specifications.

Address — BRYANT Machinery & Engineering Company
General Office
400 West Madison Street, Chicago 6
Representatives in Principal Cities

Affiliated with—

CLEEREMAN MACHINE TOOL CO. Green Bay, Wis.

BUILDERS OF PRECISION JIG BORERS AND DRILLING MACHINES

REVERE

FREE CUTTING BRASS ROD
FOR QUICK, ECONOMICAL MACHINING

1—Special flange fitting
2—Flexible tube adapter
3—½" high-pressure fitting
4—Tapered hose connection
5—Flared-type fitting
6—Bushing for pressure tube fitting
7—Inverted S.A.E. swivel union
8—Automotive brake cylinder
9—Faucet handle
10—Flared-type fitting
11—Hot water cut-off valve
12—Oil tank cap part
13—½" I.P.S. male fitting
14—Valve stem regulator
15—Welding hose connection
16—Automotive air brake part
17—Water valve stem pack nut
18 & 19—Lamp top ornaments
20—Carbureter valve
21—Welding hose connection
22—Oil feeder valve
23—Valve stem
24—Pack nut
25—Inverted S.A.E. swivel union
26—Male swivel detachable union
27—Flared-type fitting
28—Detachable ring-type hose fitting
29—Compression fitting assembly
30—Oil feeder adjusting valve
31—7/16" female compression union
32—Fuse part
33—S.A.E. long nut
34—Orifice spud
35—Worm gear
36—Threaded sleeve-type union
37—Toilet tank spud
38—Acorn nuts for finish trim
39—Hex nuts

REVERE FREE CUTTING BRASS ROD

A Versatile Metal. Though in many cases it is machining quality that is the primary reason for the specification of Revere Free Cutting Brass, this versatile metal has other important qualities that are worth remembering. It is strong, having a tensile strength of 49,000 pounds or more per square inch. Hence it can take relatively heavy loads. Threads and collars can be depended upon to stand up under stress. Another important factor is its favorable coefficient of friction with cast iron and steel in bearings. This brass is also highly resistant to corrosion, being unaffected by, and free from contaminating effects upon, a wide variety of gases and liquids, resulting in its use in valves, fittings, unions, nozzles and similar parts.

Lead Content. Revere Free Cutting Brass Rod contains about 3% lead. This is not dissolved but is thoroughly distributed throughout the metal in the form of finely-divided particles. The lead reduces friction by causing the chips to break off short, so that they are in only momentary contact with the cutting edge of the tool. This lessens the amount of heat generated. Life of the tool is correspondingly extended, and long runs without regrinding are usual.

Machining Speeds. Surface speeds as high as 700 feet per minute are possible. Rough cuts as deep as 0.020" can be taken. Such speeds and cuts materially reduce production time over other materials having less outstanding machining characteristics.

Finish. With proper tooling, parts made of Revere Free Cutting Brass Rod come from the machine with a brilliant, smooth, highly-polished appearance, due to the practically flawless surface. Any tolerance within the capability of the machine and operator may be easily obtained. Threads are sharp and clean down to their roots.

No Burrs. This metal may be cut- and roll-threaded, drilled and tapped, milled, broached, and sawed with no appreciable burrs.

Temper. In the majority of cases, Revere Free Cutting Brass Rod is supplied hard drawn. This hardness facilitates chip breakage, while the high strength resulting from drawing assures strong threads. However, if desired for special purposes, Revere can supply soft Free Cutting Brass Rod.

High Standards. Revere Free Cutting Brass Rod is drawn to close tolerances on dimensions and straightness, and is stress-relieved after drawing. The metallurgical and physical characteristics of the metal are under constant laboratory check. It is therefore especially suitable for automatic screw machines, which require stock having high uniformity in quality and dimensions.

Additional Advantages. The smooth surfaces produced by machining Revere Free Cutting Brass Rod are ideal for plating. The metal is easily soldered, can be welded if desired, and it is, of course non-rusting and corrosion-resistant. Even at a slightly higher cost over other materials, this brass often is more economical for screw machine production, due to the speed with which the various operations may be conducted, and the value of the scrap.

Consult Revere. Because no single metal or alloy is suitable for all requirements, Revere offers many, each having some outstanding virtues and advantages. Selection of the most advantageous Revere Metal for a given process, part, or product may make a big improvement in such important items as cost of manufacture, durability, and even saleability. The Revere Technical Advisory Service will gladly cooperate with you in studying your requirements.

TYPICAL PROPERTIES

REVERE FREE CUTTING BRASS ROD

Alloy No. 240

COMPOSITION

Copper	61.5%
Zinc	35.5
Lead	3.0

TENSILE STRENGTH

Hard* 58,000 pounds per square inch

Soft† 49,000

ELONGATION

% in 2 inches

Hard*	25
Soft†	53

DENSITY

0.307 lbs. per cubic inch

Coefficient of Expansion

.0000114 per °F @ 68°F

ELECTRICAL CONDUCTIVITY

26 (%I.A.C.S. @ 68°F)

THERMAL CONDUCTIVITY

67 Btu. per sq. ft. per ft. per hr. per °F @ 68°F

*Hard, Rockwell B78 (app.)

†Soft, Rockwell F68 (app.)

Revere also supplies other types of Free Cutting Brass with desirable qualities for special operations, such as riveting or upsetting, spinning, highly accurate deep drilling.

Revere Metals include: *Copper and Copper Alloys:* Sheet and Plate, Roll and Strip, Rod and Bar, Tube and Pipe, Extruded Shapes, Forgings; *Aluminum Alloys:* Tube, Extruded Shapes, Forgings.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Ave., New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. — Sales Offices in Principal Cities. Distributors Everywhere.

the *Cone Reporter notes that—*

Conomatic Progress Reporter

American Bosch Corp. has a diesel injection pump in which a single plunger and valve do the work of four or six.

Progress with Conomatics

Trouble free, profitable Conomatics are easy on your muscles and easy on your nerves. Take a holiday from worry with a Conomatic on the job.

Conomatics for *Progress*

W. G. Bickley of Imperial College, London, offers a new series of number symbols to speed the work of electronic computing machines.

Progress with Conomatics

Buffalo Niagara Electric has a new 150,000 horsepower transformer that is said to be the largest in the country.

Conomatics for *Progress*

Continental Die Casting Corp. of Detroit has found a way to combine gold and chrome plating on a single piece of metal.

Progress with Conomatics

Glenn L. Martin Co. has developed the airplane hydraulic brake for automobile use.

A new searchlight for Coast Guard cutters projects 32 million candlepower from a 900 watt mercury light source that is no bigger than a kitchen match.

Conomatics for *Progress*

The Custer channel wing plane has been successfully flight-tested and is to be made by National Aircraft Corp., Hagerstown, Md.

Progress with Conomatics

A new movie screen that is a section of a sphere and can be made to fill half the wall space of a theater has been patented. The rights have been assigned to Vitarama Corp.

Conomatics for *Progress*

Toledo Scale Co. has a new line of computing scales adapted to the present day price ranges of groceries.

Progress with Conomatics

Heil Co. of Milwaukee has a new dump truck with 18½ cu. yds. capacity.

LeTourneau's new bulldozer, said to be the world's largest, weighs 93,000 pounds, has a 750 h.p. engine, and seven-foot tires.

Conomatics for *Progress*

This winter bus operators may have a heater made by Petroleum Heat & Power Co. of Stamford, Conn., that will keep cooling water from freezing at night, pre-heat the engine and warm the interior.

Progress with Conomatics

The Conomatic frame construction is one reason why Conomatics operate at lower cost. The frame was not "inherited", it was designed. The short, well proportioned, upright frame members give better support to the tooling area than do taller, less rugged upright members of competitive machines.

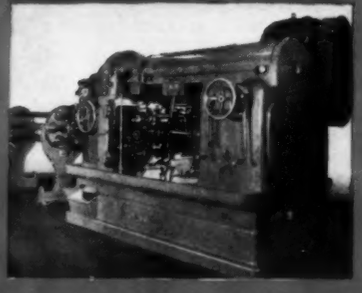
Conomatics for *Progress*

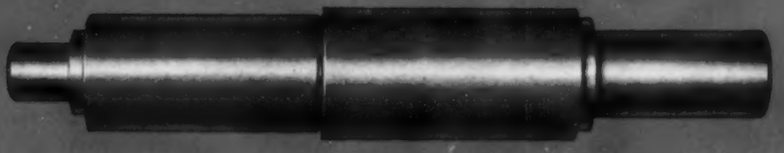
The world's most powerful electrostatic accelerator will be constructed for the Los Alamos Scientific Laboratory of the University of California.

Progress with Conomatics

Minnesota Mining & Mfg. Co. has a new tape of adhesive that is said to bond metals, fiber, wood or plastics with a sheer strength up to 3,500 p. s. i.

put *Usual* jobs on *any* Automatic
put *Tough* ones on a CONE





The transmission shaft shown is made from hot rolled molybdenum steel by a 3½" Six *in 71 seconds.*

CONE AUTOMATIC MACHINE CO., INC.
WINDSOR, VERMONT, U.S.A.
55

Betwixt and Between the Sensitive and the Heavy Duty Upright . . .

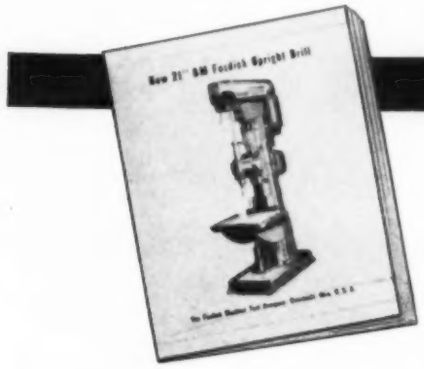
FOSDICK
NEW 21" BM
UPRIGHT DRILL

● Here's a sturdy machine built along the same lines as the Upright but designed to handle work between the capacities of the Sensitive and the Heavy Duty Upright Drill.

Nine or eighteen speeds and four feeds are available through the gear box. The power feed is operated from a positive clutch which is engaged by pulling forward on a four spoke lever. Feed clutch engages when drill contacts the work. An over-take feature is combined with power feed so that drill can be advanced without disengaging the feed dial. A lock-out prevents power feed from engaging when hand feed is being used.

A two position magnetic switch is provided for reversing direction of motor. With switch knob in tapping position, a downward motion of the four spoke lever causes tap to run in correct direction, an upward motion of the spoke lever reverses the motor and backs out the tap. With switch knob in drilling position an upward motion of the spoke wheel will not reverse the drill and destroy cutting edge.

Standard spindle speeds of 55 to 900, 110 to 1800, 225 to 1800, and 450 to 3600 are furnished.



For complete details of design, construction and specifications plus its many advantages for handling work between the capacities of the Heavy Duty Upright and Sensitive Drills — write for this new Fosdick Upright Drill bulletin 21" BMA.

FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

New Sole Supplier!

Johansson Gage Blocks

now made for all Western Hemisphere by Brown & Sharpe

With the recent purchase of the Johansson Division from Ford Motor Company, Brown & Sharpe now acquires all rights to manufacture and distribute Johansson Gage Blocks and Accessories throughout the Western Hemisphere.

Thus, industry is assured a continuing, dependable source of supply for Johansson products of the same unprecedented precision that has made them the world-wide measuring standard in mass production of interchangeable parts.

The Brown & Sharpe name is industry's guarantee that the traditional precision of Johansson Gage Blocks and Accessories will be maintained without compromise. This world-famous name has symbolized leadership in the development and manufacture of precision measuring devices, machines and tools for more than 100 years. Brown & Sharpe Mfg. Co., Providence 1, R. I.

We urge buying through the Distributor

BROWN & SHARPE B·S

For Fast, Economical Results on Your Finishing Jobs . . .

Use ALUNDUM Abrasive!

EXTREMELY hard, sharp, and tough—uniform in chemical composition, crystal structure and grain size and shape—that's ALUNDUM Polishing Abrasive!

- Try S-Treated ALUNDUM Abrasive for fast cut on your roughing operations.
- Try B-Treated ALUNDUM Abrasive for a general purpose abrasive for roughing and finishing when long life is of primary importance.
- Specify R-Treated ALUNDUM Abrasive for your finishing operations when glue is used as the adhesive.

You'll discover that ALUNDUM Abrasive speeds-up polishing jobs and produces better results for less.

For Polishing

For Tumbling

ALUNDUM Tumbling Abrasive can save you time and money too!

- It's *all abrasive* for a continuous cutting action.
- It's *heavy* for a fast, positive cut.
- It's *hard* and *tough* for a long, productive life.

For further details on ALUNDUM Abrasive for polishing or tumbling, contact your Norton abrasive engineer or distributor, or write for the free booklets "Setting-up Metal Polishing Wheels and Belts," and "Precision Tumbling with Alundum Abrasive."

NORTON COMPANY

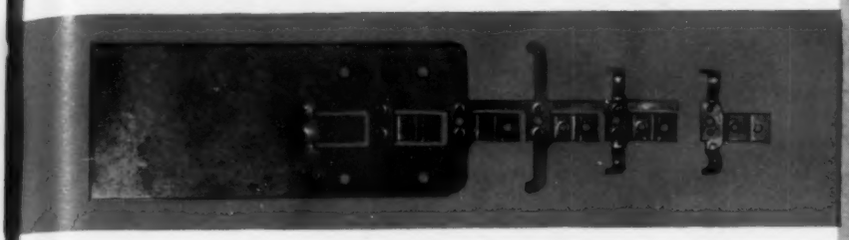
Worcester 6, Massachusetts

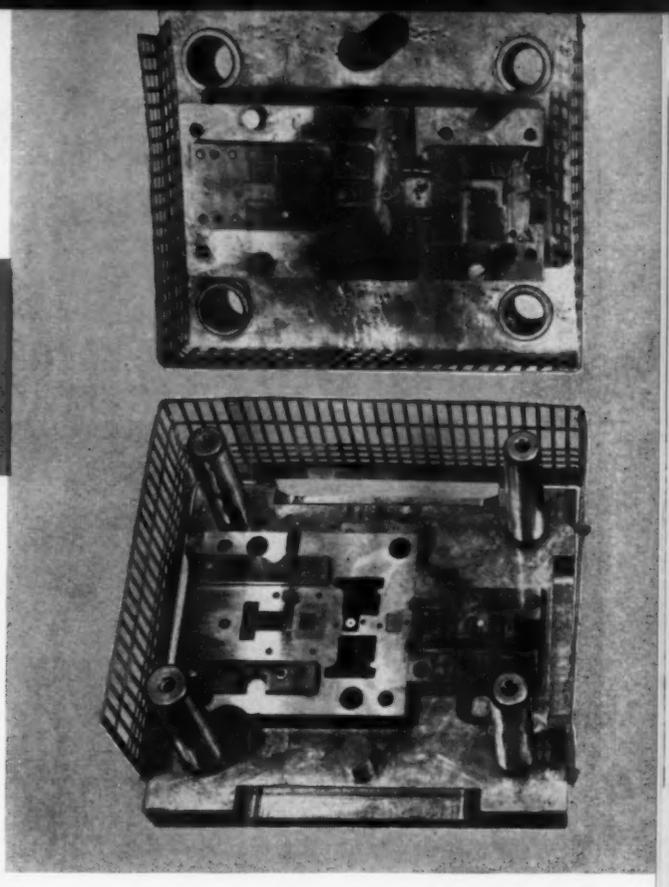
Distributors In All Principal Cities

G-199

NORTON ABRASIVES

Averages 122,500 Pieces per grind





...using DANLY Precision Die Set

6-station progressive die setup speeds production of complex brackets

save time | USE DANLY NATION-WIDE DIE SET ASSEMBLY SERVICE

Assembly plants (marked with stars) stock interchangeable parts for quick assembly and delivery of any standard die set to your specifications.

- ★ **Chicago 50,** 2100 S. 52nd Ave.
- ★ **Cleveland 14,** 1550 E. 33rd St.
- ★ **Dayton 2,** 990 E. Monument Ave.
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- ★ **Grand Rapids,** 113 Michigan St., N.W.
- ★ **Long Island City 1,** 47-28 37th St.
- ★ **Los Angeles 54,** Ducommun Metals & Supply Co., 4890 S. Alameda
- • **Milwaukee 2,** 111 E. Wisconsin Ave.
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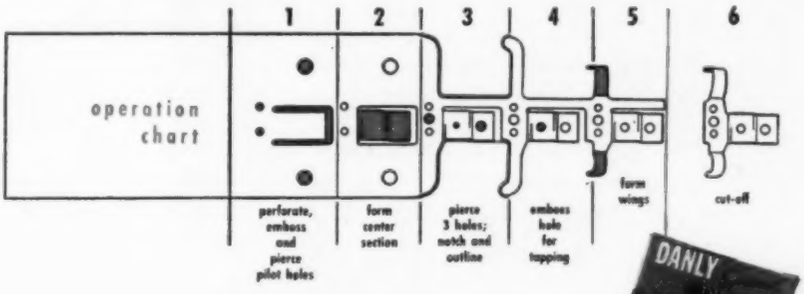
Danly Engineering Service...

Helpful engineering service will be rendered gladly without obligation. Call on the convenient Danly branch office nearest you. Whether you require close precision or the maintenance of ordinary tolerances, you will find there is a Danly Die Set available to suit your needs in any size, standard or special, for any type of press operation.

The profitable application of progressive dies as a means to speed production and cut stamping costs is illustrated by this die setup. Operating costs are held to a minimum by the maintenance of close punch and die relationship. On a run of over 735 thousand mounting brackets, an average of 122,500 pieces has been obtained per grind. To assure accurate setups and precision operating results, a Danly 4-post precision steel die set is used.

Tolerance of ± .003″ held on hole centers

The bracket is produced from 2½″ by .042″ AISI-1008 steel strip at a rate of 7152 pieces per hour. A tolerance of ± .003″ is held between the center lines of the two pierced holes and the one embossed hole. The hole sizes are held to ± .005″.



Write for this *free* bulletin

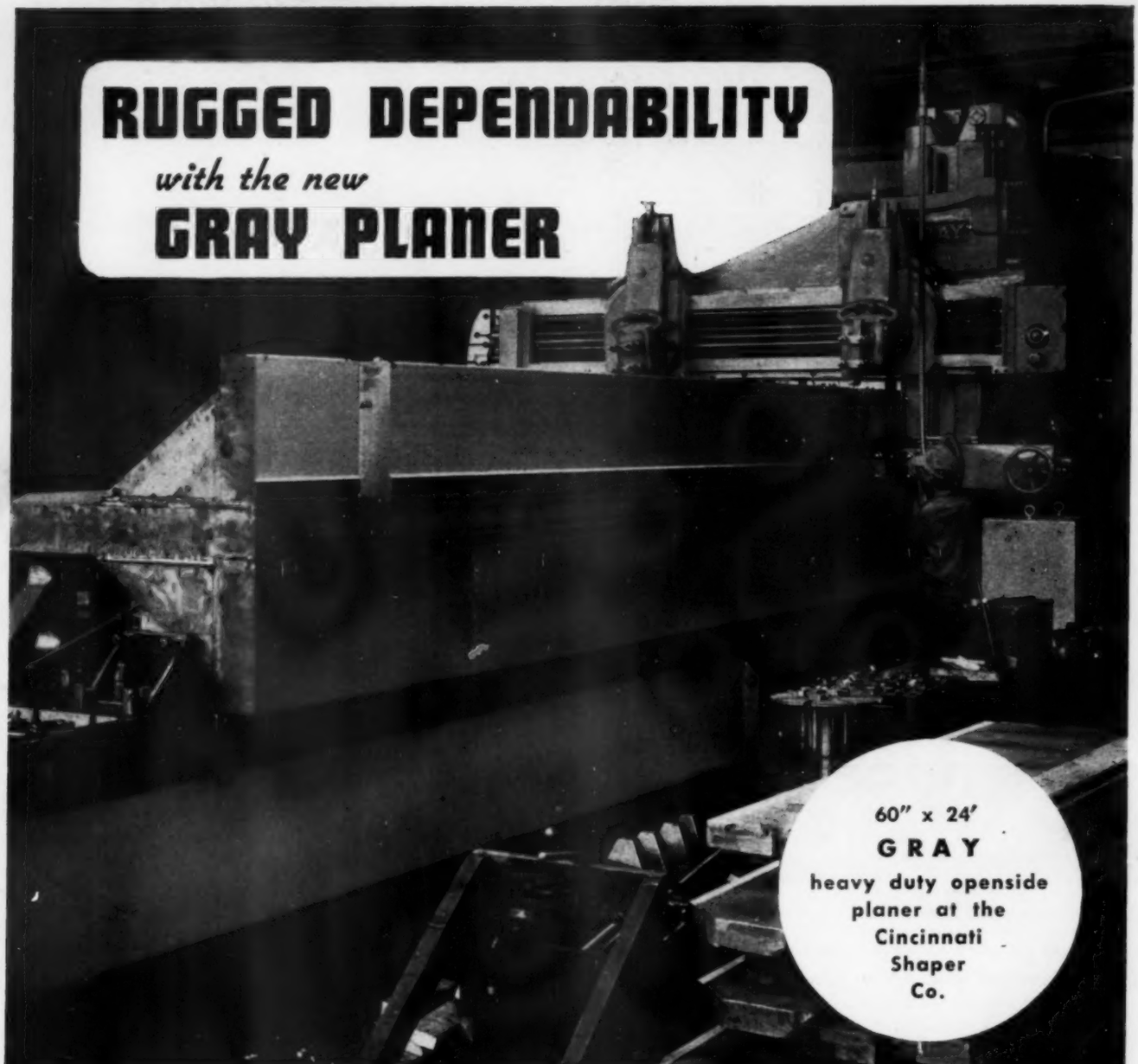
Illustrates how you can use Danly's machining service to save additional time and money on special die sets.

DANLY

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT



Heavy Production requires enormous power and a trouble free design.

The 66,000# steel bed weldment for a 400 series Cincinnati Press Brake presents a tough machining problem.

This new Heavy Duty GRAY Openside at the Cincinnati Shaper Co. offers the ideal solution for fast, economical production.

You, too, can speed production with GRAY dependable accuracy and high table speeds.

Write for Bulletins describing all the latest GRAY production features

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

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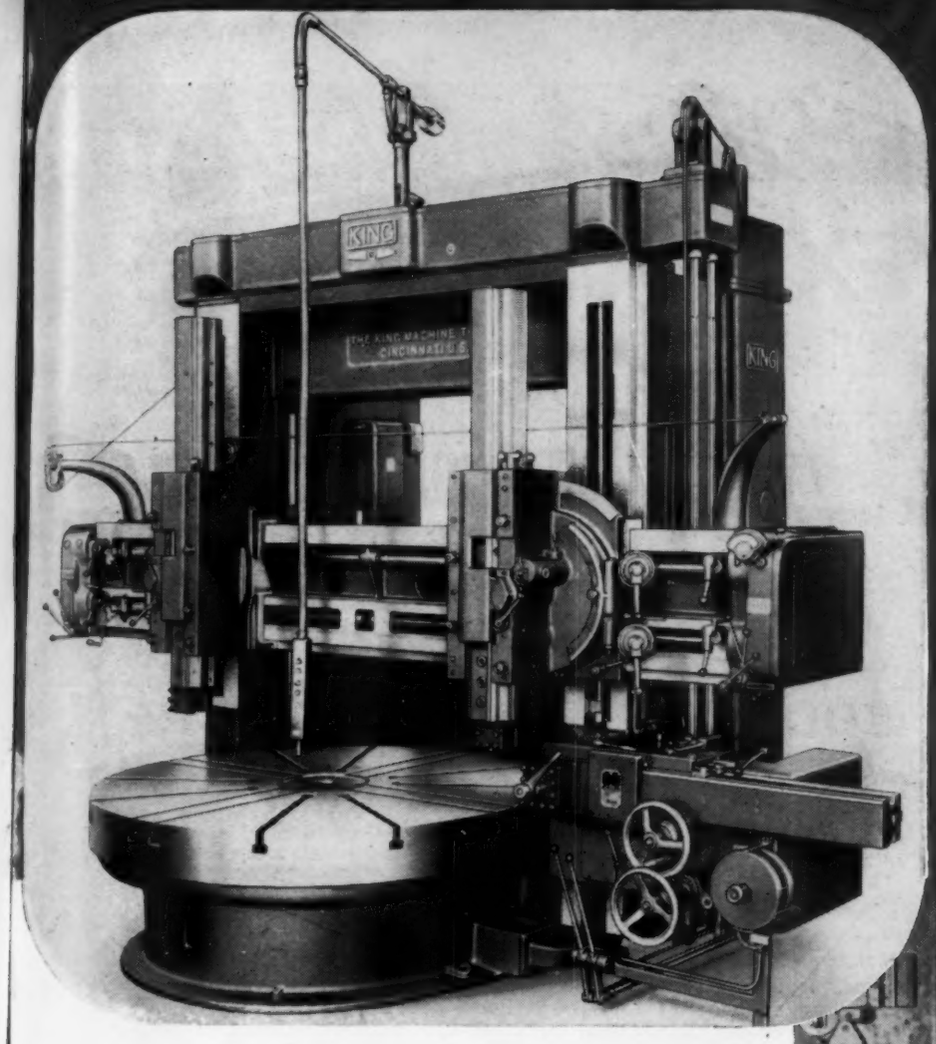

For your tough jobs large or small

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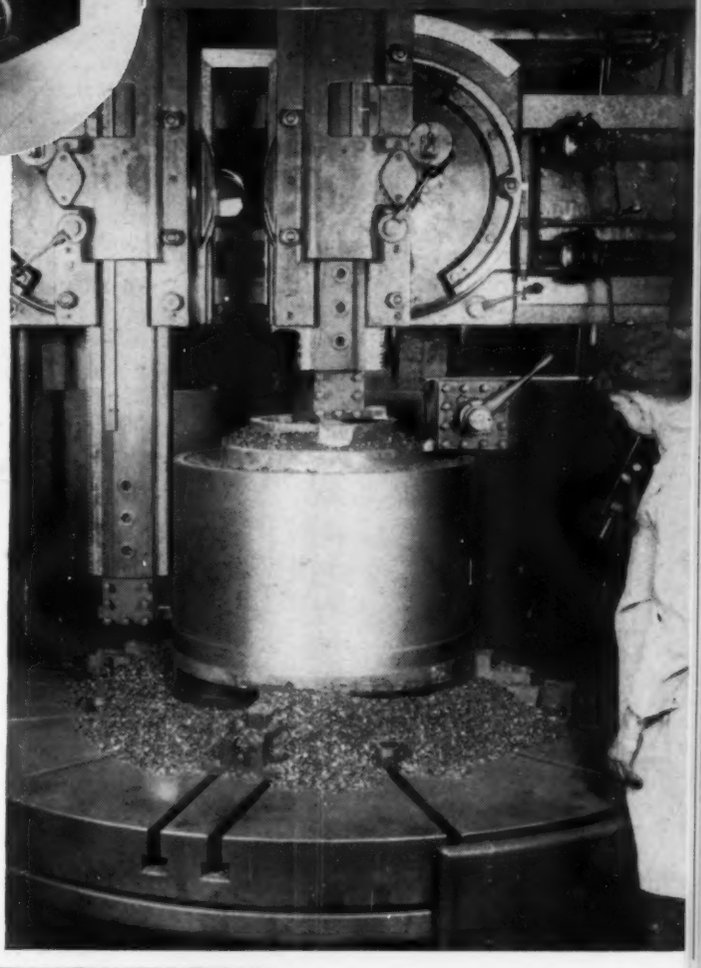
The **NEW** *Series*

KING



● Whether the job is large enough to take the full swing of the machine or merely a small job it can be handled economically on the new KING.

This new series vertical boring and turning machine has considerably more weight—new rectangular type rams—saddle for ram head square locked and fitted with four tapered gibs for adjustment—a heavy tie plate across the swivel and other construction points that assure greater rigidity, strength and accuracy.

Illustrated at the right is a 30" diameter drum on a large machine which is being turned on two diameters and faced at one time—all three heads operating simultaneously on the work. This is only one of many ways in which this new series KING can be used to advantage regardless of the size of the work.

On your turning, boring and facing work requiring greater production and lower costs to meet competitive conditions investigate the new series KING.

Available in ten sizes from 30" to 144".

WRITE FOR DETAILS

American Steel Foundries

KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of Vertical Boring & Turning Machines and Sebastian Lathes

The line with that
"EXTRA FEATURE"

UNBRAKO

Reg. U. S. Pat. Off.

(A)
Patented

Knurled
SOCKET SCREW PRODUCTS

(B)

(A) The KNURLING of this patented "Unbrako" Socket Set Screw, —as shown, —*swages* the threads, so that it becomes a most excellent Self-Locker . . . for use where the type of point does not lend itself to knurling—a Set Screw that positively "will not shake loose"!

(B) The head of this ubiquitous "Unbrako" Socket Head Cap Screw is KNURLED to speed assembly. The KNURLS "gear" right to the fingers, no matter how oily, and a positive slip-proof grip is the result—no waste motion. Of course, the Internal Wrenching feature provides cost savings in material, weight and space.

(C) The patented KNURLED cup point of this popular "Unbrako" Socket Set Screw makes it a Self-Locker . . . because the sharpened edge of the counter-clockwise KNURLS "hold fast," *regardless* of the most chattering vibration. A real fastener, if ever there was one . . . positively *will not shake loose!*

Millions of these "Unbrako" Socket Screw Products—in sizes from #4 to 1½" diameter, in a full range of lengths—are being used throughout industry to: *save assembly time, facilitate compact designs, reduce weight and costs.* As all our patented "Unbrako" Set Screws, regardless of point, are Self-Locking, we can lock most any set screw application. We are prepared to furnish "Unbrako" Socket Screw Products in Stainless Steel.

Write us for the name and address of your nearest "Unbrako" and "Hallowell" Industrial Distributor and your copies of the "Unbrako" and "Hallowell" Catalogs.

(C)
Pat'd. & Pats. Pending

Knurling of Socket Screws originated with "Unbrako" in 1934.

Kits. Pats. Pend.

You can't tighten or loosen socket screws without a hex socket wrench, so why not get our #25 or #50 "Hallowell" Hollow Handle Key Kit which contains most all hex bits.

OVER 45 YEARS IN BUSINESS

STANDARD PRESSED STEEL CO.

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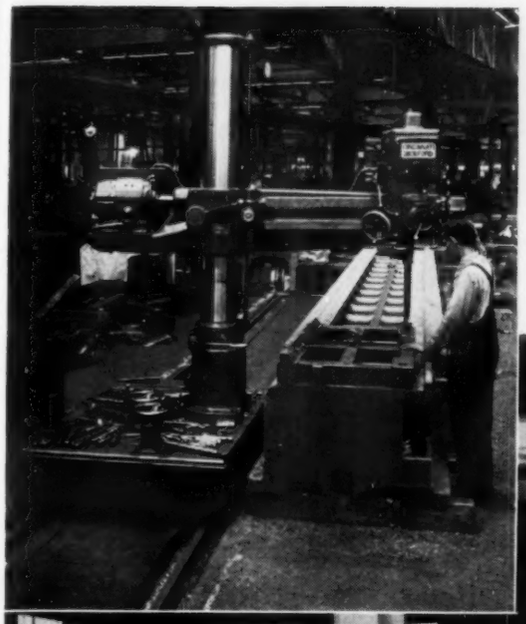
VERSATILITY by BICKFORD



BICKFORD SUPER SERVICE RADIALS and BICKFORD ENGINEERING *can Profit you!*

This powerful Cincinnati Bickford Super Service Radial, with its balanced 10′ arm and 26″ diameter column, and modern "clear visibility" head, step saving, time saving centralized controls, special circular base, has brought a high efficiency to the job.

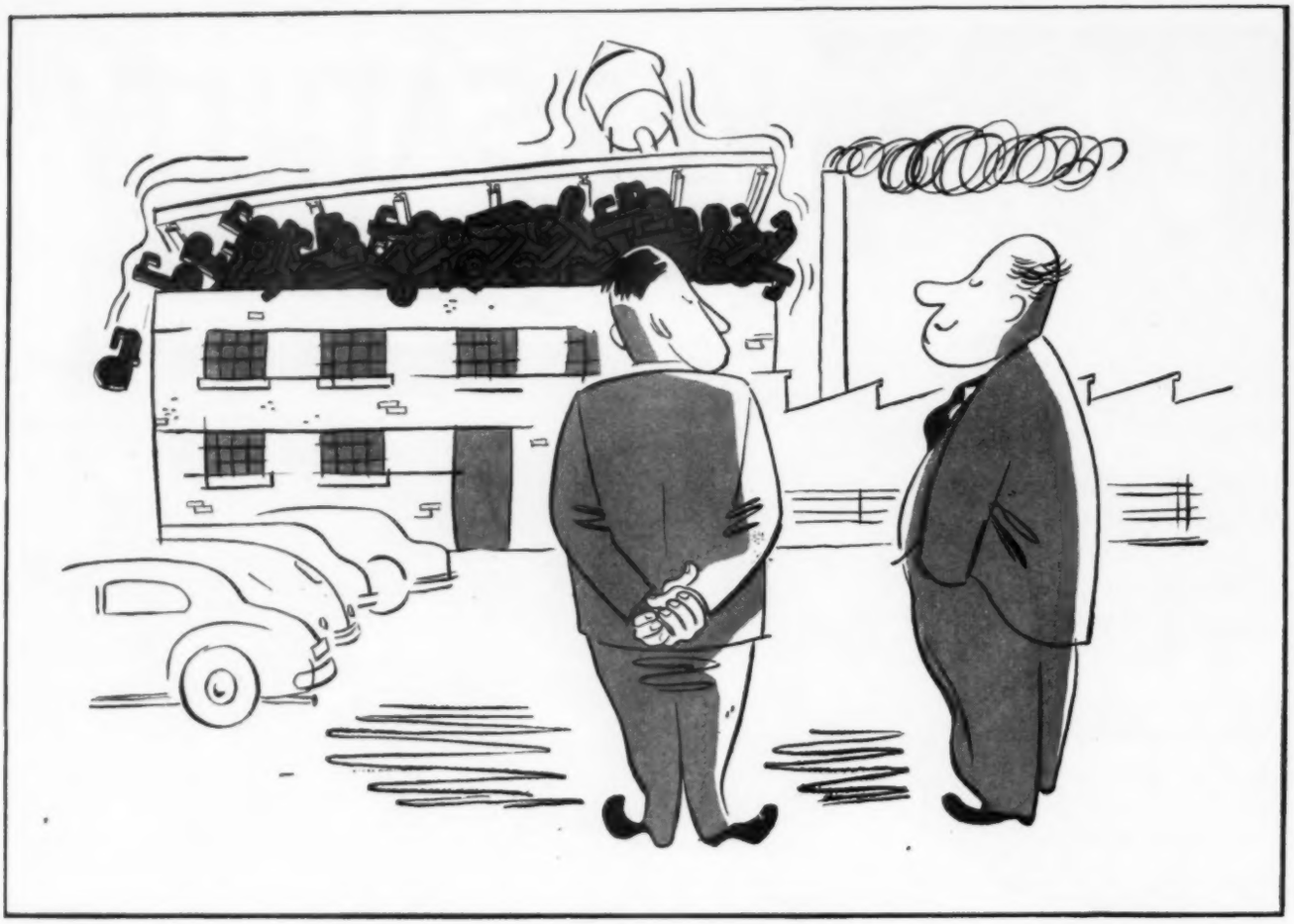
In contrast to this massive machine we show above the 9″ dia. col., 4′ arm Super Service Radial mounted on a track, and here again Bickford engineering and Bickford versatility have met the user's needs—and again given him high production at low cost. Consult us on your drilling problems.

Write for Bulletin No. R-22—on the 26″ column Super Service Radial—and Bulletin No. R-21B, covering the 9″ diam. column Super Service Radial.

THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE
Radials 7½″ dia. col., 2½′ arm, to 26″ dia. col., 12′ arm.
General purpose Uprights, 21″ to 28″ sizes.
Production Uprights, 21″ to 28″.
Jig Borers, Portable Horizontals, Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

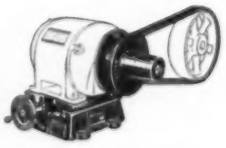


"Didn't I tell you **Reeves Speed Control** would raise our production ceiling?"

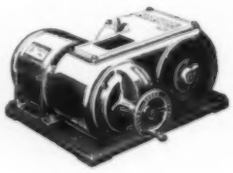
THE 3 BASIC REEVES UNITS

VARIABLE SPEED TRANSMISSION for providing infinite, accurate speed flexibility over a wide range—2:1 to 16:1. Sizes—fractional to 87 hp.

VARI-SPEED MOTOR PULLEY provides an instantly variable speed drive within 4:1 ratio for any constant speed motor. Sizes to 15 hp.



MOTODRIVE combines motor, speed varying mechanism and reduction gears in single unit. Speed variations 2:1 to 6:1 inclusive. Sizes to 20 hp.



● REEVES-equipped machines turn out more work and do more different jobs—more accurately and economically—because instant, infinitely variable REEVES Speed Control provides the right speed for every operation and every operator, under every changing condition. Specify REEVES Variable Speed Drives for your new machines—apply them to machines now in service. Let an experienced REEVES Speed Control engineer assist you in choosing the proper units for your operation from the complete REEVES line, including a wide range of designs, sizes and speed ratios—with manual, push-button or automatic control. Write for the 114-page catalog, No. A2-450A.

REEVES PULLEY COMPANY • COLUMBUS, INDIANA

Recognized Leader in the Specialized Field of Speed Control Engineering

ACCURATE • VARIABLE

Reeves Speed Control

GIVES THE RIGHT SPEED FOR EVERY JOB!

SPOT NEWS OF METALWORKING

India is asking for bids on 270 steam locomotives in this country. Baldwin Locomotive has been working on an order for 100 units for India, some of which already have been delivered.

600 top General Motors officials, headed by Pres. Charles E. Wilson, spent the entire week of Sept. 19 at Murray Bay, Quebec, discussing the future in off-the-record meetings.

Swedish machine-tool builders have taken a big order in Poland. British have booked machine-tool business in Czechoslovakia and Hungary which would have gone to U.S. if export licenses could have been secured.

Vauxhall engineers have just arrived in this country to study General Motors manufacturing operations. They will take back to England new techniques for manufacture of Vauxhall cars.

Press-like welders are used by Ford on body panels, consolidating production lines and permitting transfer of up to 60% of labor to more important jobs. Machines use "packaged" welding and clamping units to cope with model changes. Major savings arise from one handling of panels and attached parts.

Nearly $13 million for machine tools, transportation equipment and other industrial machinery is included in ECA authorizations for last month.

Secretary of Labor Tobin wants to declare as hazardous certain jobs involving operation of power-driven cold-metalworking machines. Hearings on proposed order, which would raise the legal minimum age on those jobs from 16 to 18, is set for Nov. 9.

Metalworking production during August dipped slightly, according to the AMERICAN MACHINIST Index. A 1-point decline from July was noted, putting the Index at 219.

Registered apprentices in four major machining trades increased 50% in the past year. Number on file with Bureau of Apprenticeship on July 1: machinists, 16,800; auto mechanics, 22,300; tool and die makers, 13,800, and airplane mechanics, 1,600.

Exports of metalworking machinery during July totaled $11.5 million, a 3% decline from June. Compared with a year ago, July exports were down more than 35%.

German-designed Bulldogge tractors will be manufactured in Australia. Unable to get parts for thousands of such tractors in that country, Kelly & Lewis, Ltd., measured and analyzed thousands of parts, changed the name to Bulldog and will make one thousand a year, starting soon.

Gaging Metalworking

The rise in prices of metalworking materials and components is slowing down. It appears that many of these items, following increases of 5% to 10% in recent weeks, will remain at the current level well into next year, and perhaps longer. Whether they soar further depends mostly on what happens to wage rates next spring.

While many metalworking executives are cautious about making long-term predictions, they freely express the opinion that business should be very good through the first half of 1949. Automobile manufacturers are convinced that they can sell every car that they can make in the next year. Locomotive builders are flush with orders. They have enough business on hand to keep running at full capacity indefinitely. The same happy situation exists in the turbine field.

Television Output Booms

The television industry is booming. This year some 800,000 sets will be built and sold, compared with 175,000 sets last year. Next year output is expected to jump to 1.5 million sets. Engineering construction work is at a high point and probably will stay there. Many machinery lines—textile machinery, printing machinery, paper-making machinery, can-making machinery—are active, and production rather than sales is the chief worry.

Though a buyers' market is close at hand, or is already here, in household appliances, production still is of record proportions and will stay at current heights the remainder of the year. There may be some slackening next year, but manufacturers are confident of good, steady business. Farm implements and tractors are in a lush market which promises to be big for some time ahead.

Instrumentation Orders Heavy

Manufacturers in a number of metalworking lines report that backlogs are much the same as at the beginning of the year. In the field of instrumentation, several companies say that the pile-up of business is greater than on Jan. 1. Shipbuilding is beginning to feel the good effects of recent orders for tankers and Navy ships. Operations will not come near those of wartime; nevertheless they will be substantially greater than in the last two years. Aircraft companies are gradually expanding their working forces and engineering staffs as the defense program unfolds.

Steel Continues a Problem

It is the same old story about steel. It is hard to get, and even gray market prices are reported to have risen recently. Fourth-quarter quotas have been slashed, partly because of increases in the voluntary allocation program. Dislocations caused by allocation are far more than appears on the surface. In certain items, such as plate, the percentage set aside for these "must" programs gets up as high as 30%.

Meanwhile the steel industry is producing raw steel at a terrific rate —close to 90 million tons a year. Finished steel is being turned out at an annual rate of 66 million tons, or 3 million tons higher than the rate a year ago. It still is possible that the amount of so-called "free steel" available may be bigger than was first anticipated.

Aluminum Output Rises

August aluminum production reached the second highest level of the year, with the end of flood conditions in the West which hit the industry in June. During August 109,906,356 pounds were produced. The high for the year was in May with 110,900,000 pounds.

During June a low of 97,566,606 pounds were produced, with a step up in July to 105,873,891.

Aluminum consumers, however, should not expect an increase in the amount of metal available. Quotas were cut as a result of the low June and July output. Despite reports to the contrary, demand for aluminum has continued unabated and a balanced market is still believed to be some distance ahead.

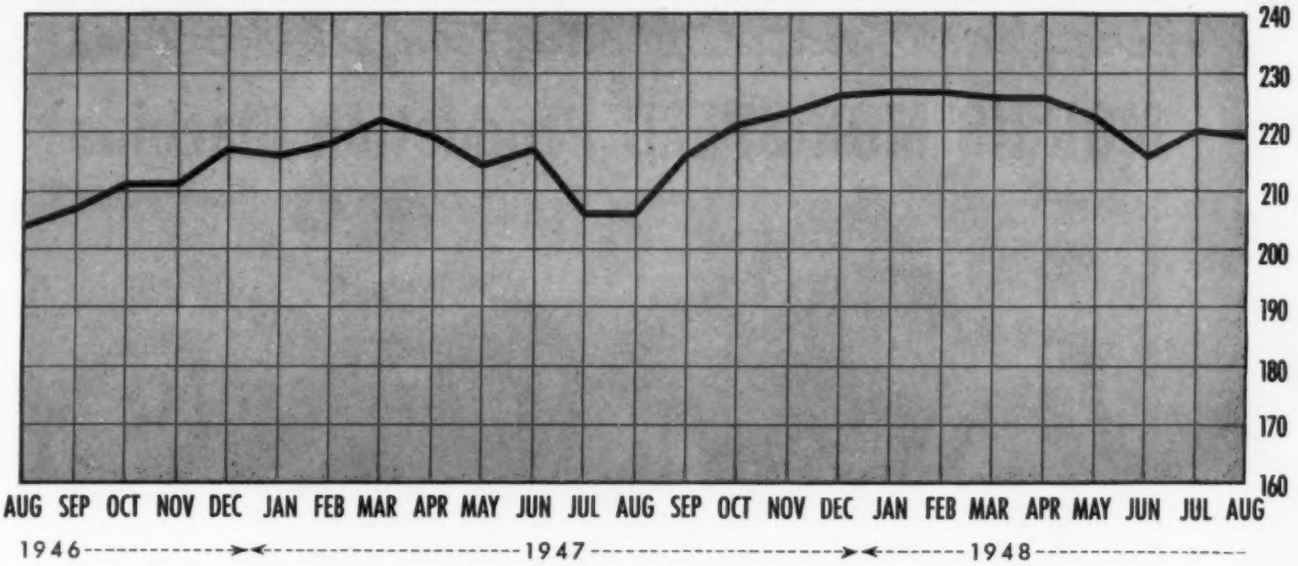
Lead Outlook Brighter

In other non-ferrous metal markets, demand has continued to exceed supply. Prices are firm. One bright spot is the ending of the strike in the Missouri lead belt. Increased output, curtailed sharply in July, will help to relieve tension in the lead market. Copper consumption continues to increase and supplies of zinc remain tight. Building of U.S. stockpiles of strategic metals will be

NON-AGRICULTURAL EMPLOYMENT STEADILY RISING

DATA: BUREAU OF CENSUS, McGRAW-HILL DEPARTMENT OF ECONOMICS

American Machinist INDEX OF METALWORKING PRODUCTION



INDEX		COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANS-PORTATION EQUIP.	OTHER METAL-WORKING
AUG. 1948.....	219	247	225	224	306	146
JULY 1948.....	220	250	226	229	305	147
AUG. 1947.....	206	233	224	206	259	142

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

discussed in a series of meetings with the Office of Industry Cooperation.

Machine Tool Sales Fair

Machine tool orders in August were almost the same as in July, at 73.6 on the index of the National Machine Tool Builders' Association (1945-1947 is taken as 100). Shipments rose to 69.2 against 62.4 the previous month. The ratio of unfilled orders to shipments as reported by association members, is 5.2 to 1. That represents a decline from 5.9 to 1 in July.

Foreign orders were 12.7% of total new orders. Normally such orders are about one-fifth of the industry's business, and last year shipments for export added up to 26%. But dollar restrictions have brought about the present low state of the industry's foreign sales. Thus far the mere trickle of ECA-sponsored business has not relieved the situation.

Detroit Placing Orders

ECA machine tool orders will begin filtering through this quarter and probably will grow in volume the first quarter of 1949. Domestic sales are fairly good. Packard has placed some sizable orders for special machines for its automatic transmission program. Buick is in the throes of a further transmission program which involves a lot of machine tools. And quotations are out on a sizable tooling program for Chevrolet's contemplated automatic transmission. Not much aircraft engine business has come through recently. For its Kansas City operation, Westinghouse will require millions of dollars of machine tools. It first will comb government surplus for available equipment, in accordance with Air Force wishes. But it is firmly believed that almost all of its anticipated needs will have to be filled with new machine tools.

Gear Sales Decline

The new gear sales index of the American Gear Manufacturers Association shows that the volume for the gearing industry decreased 3.6% in August compared with July. The new index figure for August is 335.6, with 1935-1939 as 100.

Production in the machinery and automotive fields slackened during August, causing a 1-point drop in the American Machinist Index of Metalworking Production to 219. The machinery component was off 3 points to 247 and the automotive component dipped 5 points from the July figure to 224. Electrical manufacturing and other Metalworking slipped 1 point each to 225 and 146, respectively. The only gain was in Transportation Equipment which rose to 146. The figures reflect the normal seasonal drop in production.

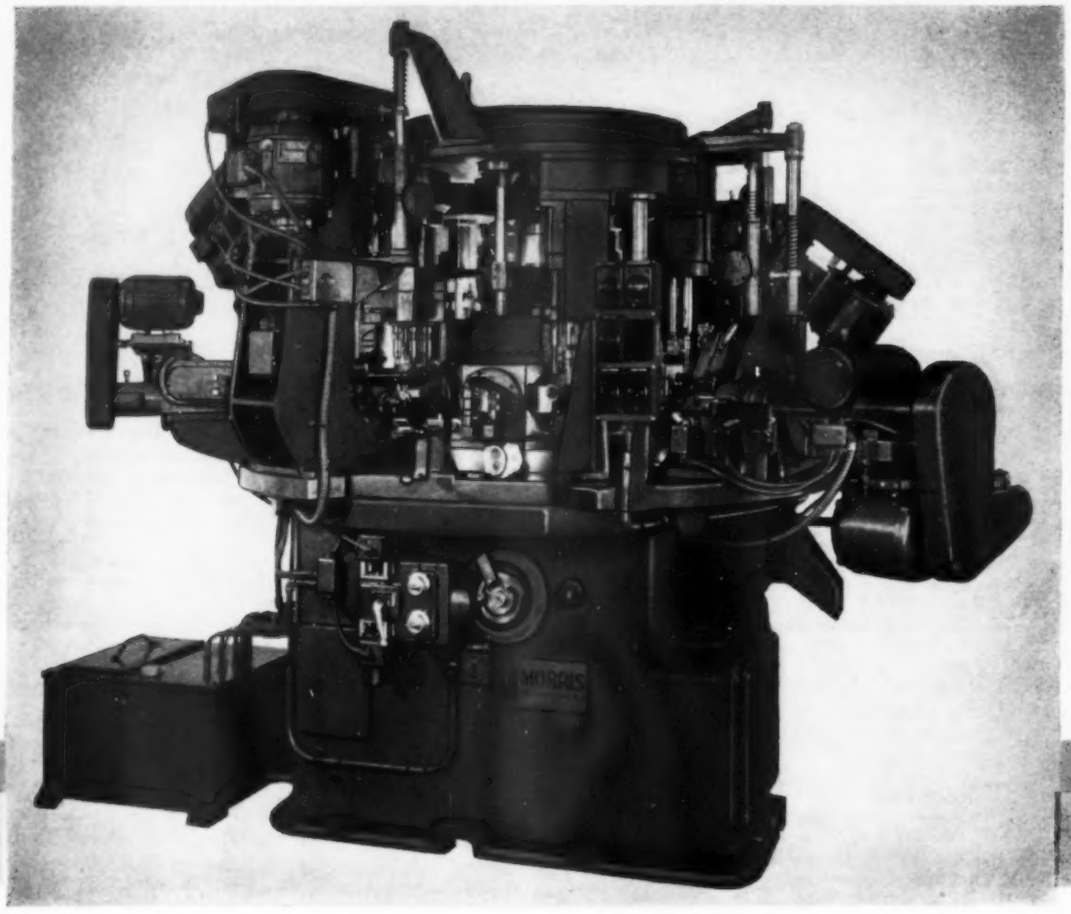
Resistance Welders Sought

Orders for resistance welding equipment increased 22% in August compared with July, according to the Resistance Welder Manufacturers Association. Though shipments during August dropped slightly, they kept up with new orders. The industry has on hand four months of work. Shipments of resistance welding electrodes expanded in August too. Electrode shipments are running 15% higher than a year ago.

Makers of anti-friction bearings are getting a growing amount of business from jet engine builders. They are setting aside certain productive capacity and special raw materials reserves to meet the needs of the aircraft industry as the defense requirements broaden. Some companies have announced price increases up to 10%.

Here's automatic production at its best-

MORRIS MOR-SPEED Production Machine



● On this machine the operator merely loads and unloads the work while machine is operating on the piece. All machine functions including the indexing are automatic.

The machine drills—taps—spot-faces—and reams carburetor main bodies on a mass production basis for a prominent automobile concern.

The machine of vertical design has 12 automatic indexing four position fixtures, 20 drilling spindles, 7 facing spindles, 15 tapping spindles, 1 brush spindle and 4 reaming spindles and turns out a completed piece at every index of the turret.

Here is another typical instance of where Morris developed the machine to meet specific job conditions. If you are interested in the high production of work requiring drilling, reaming, tapping, facing and similar operations consult Morris—they have the experience, engineering ability and facilities to help you.

Write for our Mor-Speed Production Machine Bulletin showing the wide scope of our operations with specialized equipment.

Builders of MOR-SPEED Line

The MORRIS *Machine Tool Co.*

CINCINNATI 3, OHIO

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The Search for Lower Costs

A large metalworking company finds that its cost of handling work in process is 26% of all manufacturing expense. It now is searching for ways and means of reducing that cost.

Another company has set up a production "laboratory." The new department has been given generous floor space, has been staffed with plenty of engineers, and has as its objective the development of improved production methods.

Still another company is busily engaged in perfecting technological advances in its manufacturing processes. It expects to achieve notable results in the next year.

A fourth company is redesigning its products. Its present products are not outmoded, but it is imperative that they be made at a lower labor cost. The management is trying to put fewer hours of labor into each piece.

These four metalworking firms, typical of thousands of others, are deeply concerned about the terrific upsurge in wage rates. If they merely let nature take its course, their prices eventually would soar sky-high. They would price themselves out of the market.

Instead of sitting by and doing nothing to arrest the upward trend of labor costs, they are taking action where it will count.

What they are doing stresses the present-day drive in Metalworking to cut costs. Every manufacturing operation is under inspection, every movement of materials in the plant is being studied, every product is being looked at closely to see whether it can be made more economically.

What an opportunity for the design engineer to do a job! What a chance for makers of cost-cutting equipment to tell their story and prove their point!

Technological improvements will come fast the next few years. The spurt in mechanization will be tremendous.

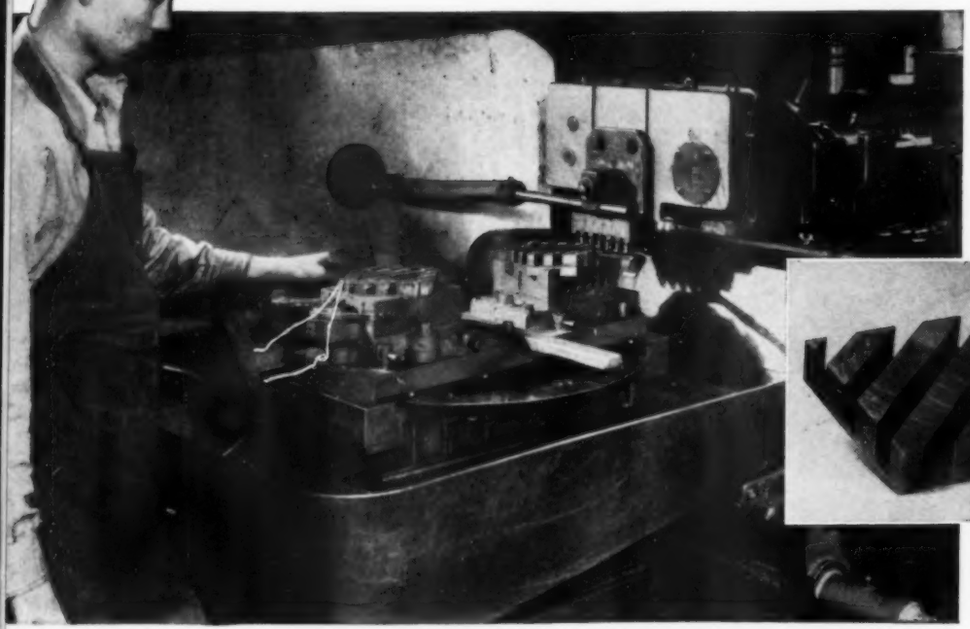
Ten years from now we are likely to look back at our manufacturing processes today and wonder why we did so many things in such an old-fashioned way.

Burnham Finney

EDITOR

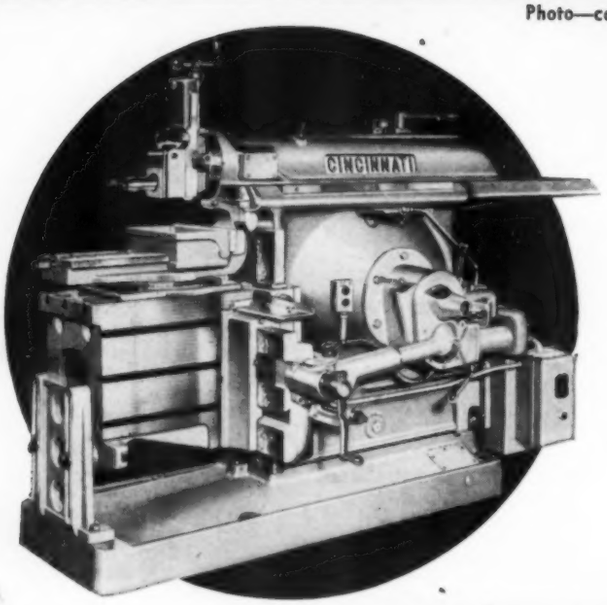
90 pieces per hour

...on this CINCINNATI SHAPER



Photo—courtesy Printing Machinery Co.

Work piece is a malleable iron, Warnock diagonal block. Rate of production, 90 per hour. Specially designed gang tool holder carries six form ground high-speed tools.



This high production, special Cincinnati Shaper, designed by Cincinnati engineers, is completely automatic. With a comparatively low initial cost, and low cost of tooling, it gives a high return on investment.

The operator starts the machine; the head feeds nine strokes to right, nine to the left, and the Shaper automatically stops at rear position. The operator indexes the fixture and then starts another cycle. Loading and unloading are done while the Shaper is cutting.

Consult us on your shaping job, and the possibilities of a special Shaper.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

HOW FAMILY STATUS AFFECTS VOCATIONAL ADJUSTMENT

Studies on attendance, turnover, progress and morale prove that a man's domestic situation is a powerful force in his job success . . . These findings indicate broad new responsibilities for industry

BY LEE STOCKFORD, Industrial Relations Adviser and
KARL R. KUNZE, Employment Manager
Lockheed Aircraft Corporation, Burbank, Calif.

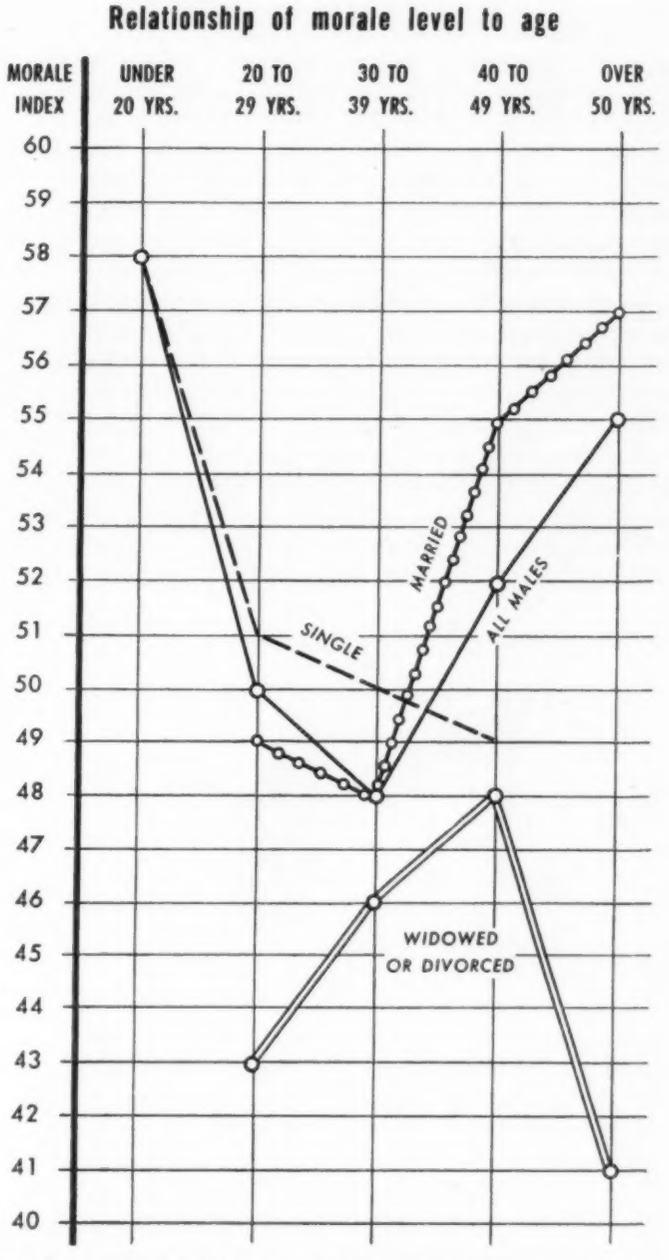
MARRIAGE and dependents are major motivating forces in the lives of men. Under the stimulus of family responsibility, the average male works steadier, sticks to his job longer, gets further in his vocation and generally exhibits higher morale than does his unmarried counterpart. There are significant conclusions drawn at Lockheed Aircraft Corporation from investigations described in this report.

It is only in recent years that industry has focused its attention on the family unit. At one time the only ones studying the family and its influence upon the individual were the sociologists. Later, two other groups entered the picture. One, the clinical psychologists, considered the ability of the individual to adjust to life in relation to his family conditions. The other, composed of economists, studied problems of the family in relation to its financial structure.

This report, reflecting a mixture of the approaches of these two newer groups, analyzes the ability of the individual to adjust to his job in terms of his family status.

The study restricts family status to marriage and number of children and makes no attempt to measure the adequacy of either marital relations or domestic life, although it is well known that these factors have a marked effect upon the individual. The report measures ability to adjust to the job in terms of attendance records, termination rates, progress, and morale or attitude. It does not include quantity or quality of output or other criteria of job ability.

The data presented in this report are drawn from several studies made to determine the relation of measurable traits and characteristics to various criteria of successful job ad-



Morale curves establish a trend for each of three marital-status groups and for a fourth group consisting of all males. Married men in the older brackets scored higher than all other groups of equal age. Points on the curves represent mean scores attained by respective age groups from an arbitrary rating of responses to a questionnaire designed to reveal employee attitudes. Higher values indicate higher morale

justment. These studies showed that there are many traits related to each specific criterion. They also showed that there are few general traits that are related to *all* the criteria. One of these few traits is the family status of the individual.

Absenteeism

Several studies indicate that much of the cause of absenteeism, while apparently inherent in the job, is actually external to it. One explanation[1] is that the repelling factors on and off the job overbalance the attracting ones. These factors may be any aspect of social or work life to which an individual has attached emotional significance. Examples are: (1) recognition for commendable performance given to or withheld from a worker by a supervisor, (2) skills of the employee in relation to the requirements of his job, (3) status of his job in the community. When the repelling aspects predominate, there is a loss of motivation and consequent absence from the job. Then the individual seeks excuses and over-emphasizes minor points about his work to justify his absence. This is a form of escape.

To overcome this and to promote the motivation to attend work some stabilizing influence must be present in the life of the individual. These stabilizing factors can be social, cultural, psychological, or economic in nature. One study[2] lists the marital status and number of dependents of the individual among those factors having a direct bearing on attendance rates. This study shows that, as the number of dependents grows, or as economic responsibilities increase, absence from work decreases.

AWOL?—Not with dependents!

Another study[3] indicates that married people, home owners, and people living with their families are a significantly larger proportion of those with perfect attendance records than of those with poor attendance records. In comparison to the absentees, those with good attendance records (1) lived under less crowded conditions (as measured by the ratio of people to the number of rooms in the dwelling), (2) were less burdened with debt, and (3) had better savings programs.

[1] Kunze, K. R. and Branner, R., "Motivation and Absenteeism." *Personnel Journal*, Vol. 23, No. 2, June 1944.
[2] Jackson, Joseph H., "Factors Involved in Absenteeism." *Personnel Journal, Vol.* 22, No. 8, February, 1944.
[3] Stockford, L. O., "Chronic Absentee and Good Attendant." *Personnel Journal*, Vol. 23, No. 6, December, 1944.

Voluntary Termination

Another criterion of satisfactory job adjustment is the length of employment before voluntary termination from the company. It may be assumed that, as a group, those who have stayed at a job for a longer period of time before quitting have made a more satisfactory adjustment to the job than have those people who quit after a short employment.

The problem of employee turnover and termination rates was studied from two approaches. The first was through interviews in the homes of the ex-employees within two to four weeks after their voluntary termination[4]. The interviews were conducted by special investigators from an outside agency. The purpose of the study was to determine (a) why people quit their jobs, and (b) the influence of such factors as age, sex, seniority, marital status, shift, type of job, etc. upon their reasons.

Why People Quit

The results showed that the principal reasons why married people leave are quite different from those of the single people. Among married people personal problems (such as "health," "moving from the community," and the "need for more money") are most frequently given as reasons for quitting. Among the single people, "job placement" and "general dissatisfaction" are the most frequent reasons, with "health" and "need for more money" given at a significantly lower frequency. Thus, it seems that marital status exercised a positive tempering effect on the attitude of the individual.

The second approach to this problem was through a statistical analysis of the records of some 475 active and inactive employees[5]. In this study a series of relatively independent objective factors were analyzed to determine which would differentiate those employees who were hired and remained active during the six months from January 2, 1947, to June 30, 1947, from those who were hired but quit voluntarily in the same period of time. Those in the former group were called *actives*, in the latter group *inactives*.

Of the 29 items measured, there were eleven that differentiated the actives from the inactives and that continued to be of value in further studies. Of the eleven (subsequently to be weighted and used as part of the application blank) economic factors, marital status, and number of children were among the more significant.

Earnings Are Significant

Economic factors, which obviously exert a strong influence on family life, appear to be most significant. Those who had earned a relatively low rate of pay over the two years prior to their job at the Lockheed plant, and who had enjoyed an inordinately rapid and substantial increase just prior to their

[4] Palmer, D. L., E. R. Purpus, and L. O. Stockford, "Why Workers Quit," *Personnel Journal*, Vol. 23, No. 3, September, 1944.
[5] Kunze, K. R., "Factors Influencing Termination Rates." Lockheed Aircraft Corporation (Pre-publication Release) Feb., 1948.

Lockheed job, and lastly, who suffered a rate reduction upon hire, were most prone to terminate voluntarily shortly after becoming employed.

As to dependents, actives had, on the average, twice as many dependents as had the inactives. Actives also demonstrated greater family stability in that they moved considerably fewer times than the inactives during the two-year span prior to Lockheed employment.

Thus, marital status and responsibilities form part of an employee's motivations and prompt him to stick to his job longer than he might have if these factors were not present in his life.

Success in Supervision

In another study[6], a series of factors were correlated with several criteria of success in supervision. Fifty-four traits and characteristics for each of 478 men in the lowest level of full-time salaried factory supervision were analyzed.

The men were divided into four relatively equal groups labeled *Superior, Good, Fair,* and *Poor* based upon a composite rating of administrative, supervisory and technical ability. Of the 54 traits studied, 16 proved to be of value in differentiating men in the two better groups from men in the two poorer groups. Among these 16 traits were marital status, number of children, and home ownership.

The study showed that the percentage of single men in the better groups (5%) is significantly less than the percentage of single men (20%) in the poorer groups. Also, the percentage of men in the better groups with one or more children (80%) is significantly greater than the percentage of men in the poorer groups (55%) who have one or more children. Finally, the difference between the percentage of men in the better groups (55%) who own their own homes and the percentage of men in the poorer groups (45%) who own their own homes is reasonably significant.

At a later stage in the study, these three factors (marital status, number of children, and home ownership) were combined with a fourth item—"length of residence in the community"—to be, from that point on, treated as a single group-factor called "community stability."

In four subsequent validation studies this factor continued to differentiate the better from the poorer supervisors. In brief, "community stability" is directly and positively related to:

(a) the superior's opinion of the subordinate supervisor

(b) the ability of the supervisor to "get production" as measured by the output of his subordinates

(c) the supervisor's ability to control labor relations problems and grievances

(d) the individual's ability to rise to the higher levels of management.

[6] Stockford, L., "Selection of Supervisory Personnel" *Personnel*, Vol. 24, No. 3, November, 1947.

Morale or Attitude

A survey, conducted as part of a review of the adjustment of the physically handicapped worker in industry[7], studied the attitudes of over 650 male employees through an opinion questionnaire. Results indicated that there were some slight differences in morale level between the physically handicapped and the normal workers, and some differences between workers with different handicaps. However, it was apparent that certain social and economic factors had a much greater influence on morale level than did physical handicaps. Of the factors other than handicaps, two had a direct bearing on this report: (1) marital status and (2) age.

The questionnaire contained a series of items in the form of either a statement or a question. Each item was followed by several choices, one of which was to be selected as the response that best reflected the attitude of the individual. Responses were arbitrarily evaluated from 1 to 5 with lower values placed on responses reflecting poorer attitude.

The questionnaires were scored on a scale which ranged from 17 to 80, with the higher figure indicating a higher level of morale. Results varied between 27 and 77 with the mean score at 50, just above the midpoint of the scale which fell at 49. Mean scores are shown in the accompanying table.

MORALE RATINGS

MARITAL STATUS	UNDER 20 YEARS	20 TO 29	30 TO 39	40 TO 49	50 YRS. AND OVER
Single.....	58	51	50	49	—
Married....	—	49	48	55	57
Widowed or Divorced	—	43	46	48	41

The single-and-under-20 group has the top score with two married groups, 50 years and over and 40 to 49, taking 2nd and 3rd place respectively. The widowed and divorced were the low scorers in any age group.

Thus, the best attitudes or highest morale is to be found (1) in those people who still possess the exuberance of youth and (2) in those who have the stabilizing influence of marriage and who have over a period of years made a reasonably satisfactory adaptation to the general process of living. Also, it may be concluded that those men whose home life has been disrupted by either divorce or by the death of the wife manifest low industrial morale.

An interesting finding of this study lay in the relationship of age to morale level in chart form. Results are not significantly different from the pattern presented by Benge and Copell[8].

[7] Brighouse, Gilbert, "The Physically Handicapped Worker in Industry," California Institute of Technology, Industrial Relations Section, Bulletin No. 13, June, 1946.

[8] Benge, Eugene J. and Don F. Copell, "Employee Morale Survey" *Modern Management*, 1947.

Odd man is out . . .

Morale Varies with Age

Morale is high among the younger males (under 20 years of age). As people grow older morale drops and reaches its low point in the middle 30's (somewhere between 33 and 37). Benge and Copell found the low point between 20 and 29, but show those between 30 and 39 only one point higher in the scale.

Morale then climbs steadily reaching a high point between 50 and 59 years of age. The number of people over 60 was too small to permit the setting up of a separate age group for them alone; however, their scores are quite comparable to those of men aged 50 to 59. Therefore, it seems that at some age in this range the curve showing morale in relation to age levels off.

Because of myriad pressures and customs, few men are married before the age of 20. There were none in this study. Thus, it is impossible to show morale levels at all age-ranges for the married men or for those who were widowed or divorced. Likewise, the absence of single men over fifty years of age prevents the showing of the morale level of older single men.

From the data shown, however, it is concluded that the young single men have a higher morale level than young married men or young men who are widowed or divorced. Conversely, morale is higher among older married men than it is among older men in either of the other two categories. Morale is lower among those who are widowed or divorced at any given age range than it is among those in either of the other two categories.

Speculation

The relationship of domestic status to job adjustment as disclosed by these various studies of absenteeism, turnover, morale, and success in supervision, has an important bearing on personnel administration. It suggests that industrial programs designed to raise employee productivity or to reduce labor costs should consider more than the usual factors such as pay rate and physical environment.

The relationship also indicates that an employee is a part of the situation to which he is responding at any time. Individual attitudes, interests and emotions, many of which have their roots in domestic life, play an active part in determining how a person will think and act under any circumstances. Thus, much of what a person reacts to is himself or rather his own problems that he is projecting into the job situation. This may involve a decision to go to work, or to stay away from it; to try for a promotion, or to be satisfied with his present status; to grumble about or to praise his company.

This close and constant interaction between the individual and a given situation will differ from person to person, from circumstance to circumstance. An employee's behavior may be guided by his feeling of financial responsibility to his family, his desire to live up to the prestige he feels he has acquired with his family; or conversely, by the realization that with no domestic responsibility he may give way to "whim" and take "time off" when desired. However, in these instances, it appears that the employee is solidly a part of the situation to which he is responding, and his "domestic conditioning" is reflected in the attitude he brings to work with him each day.

No doubt, of the studies described in this report, the one pertaining to morale is the most significant. It is known from experience that morale level and the other factors mentioned, attendance, turnover and success in supervision, go hand-in-hand; and these latter factors are in part manifestations of that subjective element—morale. Since morale is so important, further speculation is warranted.

College Men Change Jobs

Studies, conducted by universities and colleges regarding the employment histories or career progress of former students, provide information that bears upon this report. Investigations show that some years after graduation ,a large portion of college students find themselves in vocational fields unrelated to those for which they were trained.

Although the frequency with which graduates shift to different vocational fields varies from field to field and even from time to time within any given field, the significant fact, in this instance, is that a considerable percentage of students *do* make the shift. Since this is true among those who have spent a large amount of money, time and effort in specific preparation for a given type of work, it can be assumed that at least an equal or greater percentage of those who have not taken advanced training will

. . . for a good cause!

also shift their fields and some few years after leaving the public schools will find themselves in a field of work unrelated to that for which they aspired.

This shift in vocations or failure to achieve desired occupational goals probably has a direct effect on the lowering of the individual's morale. This condition may be aggravated by the assumption of domestic responsibilities to the extent that the morale of younger married men drops to a lower level than that of younger single men.

However, this factor of marital status carries with it certain variables that motivate the individual, once he has resolved to adapt to the situation in which he finds himself. These stimulate him to work a little harder, to make fuller use of whatever aptitudes he possesses; and, in general, to make a better adaptation to the process of living in later years.

Conclusions

Upon the review of the data presented in this report it is of interest to ask, "What conclusions should be drawn from the study?" Shall we say, that no single men should be hired? Or, that the promotion of divorced males into jobs of responsibility be discouraged? Or, that only those with families and homes be singled out for training and upgrading? In each of these instances the answer is obviously, "no." The conclusions are much broader.

1. These observations and studies give group measurements and comparative statistics. Their chief value lies in the fact that they are of utmost assistance in the *definition of various problems,* and that they "set the stage" for more specific research studies to be conducted in the future. For example, much more can be done in determining the effect on job adjustment of the biographical data included on most industrial application blanks.

2. They demonstrate, through quantitative evidence, that there are present, within the individual, factors that are more basic than those with which industry usually deals. Industry could profit considerably by concentrating on conditions of the home and family in job-adjustment problems where remedial treatment is most needed.

If it is agreed that the employee reacts to a total situation and that he is a part of the situation to which he reacts then the problems and conditions of the man are as much entitled to special study as is his behavior. In fact, his behavior is often the sympton of a condition; and to treat behavior alone is analogous to treating a temperature of 103° rather than the infection that caused the fever.

3. In recruiting people from the general labor market, industry should revamp its campaigns so they appeal to the individual because of his ability to identify himself with a given situation. The employee identifies himself with the work situation in terms of the degree to which employment in a given concern will fulfill his needs. These may be security for his family, education for his children, prestige in the community for some other factor found through investigation to be of significance. Industrial programs of this type would be more effective than those which feature impersonal unattached reference to pay rate and working conditions.

4. They show that the presence of certain conditions has a beneficial effect upon behavior. As a consequence industry should assume some responsibility for the fostering and perpetuating of such conditions. Industry also should determine through research what alternative motivating forces can be supplied to those men who lack the specific motivating force in question.

This responsibility has been tactitly assumed by many industrial, political, civic and religious leaders during recent years. Numerous addresses end on the theme that, "American Democracy must be made to work at home if current international problems are to be resolved on a peaceful basis."

The answers to questions implied in this remark will come only after investigation. It is likely, owing to the complexity of our economic and social organization, that no one course of action will be sufficient; but, that many things will have to be accomplished if democracy is to continue working. Undoubtedly, two of the subjects to be studied are those of morale and motivation.

From Maier[9], one sees morale as the mental state that accompanies the success of the individual in satisfying his needs. Poor morale is manifested in the regression of the individual with increased indications of frustration. This may result in his rejecting (mainly through a loss of confidence) the group with which he has been associated as no longer being the channel through which he can best satisfy his needs. Golden and Rutenberg[10] imply that this rejection of an established group by the individual and his subsequent attachment to another group is one of the prime forces behind union membership.

Go for that line? —Not Me!

If there is reason for alarm that some people might accept a philosophy of political and economic organization other than democracy, then it would seem logical that more research studies designed to shed light on the practical aspects of "motivation," "morale" and "need-satisfaction" should be conducted. Since industry is on the "firing-line," it should assume a large share of the responsibility for conducting these studies.

[9] Maier, Norman R. F. "Psychology in Industry," Houghton Mifflin Company, New York, 1946.
[10] Golden, Clinton S., and Harold J. Rutenberg, "The Dynamics of Industrial Democracy," Harper Bros., New York, 1942.

Radio-chassis merry-go-round moves 77 fixtures around a 57-ft. by 63-in. track tilted at 30° in front of seated assemblers. Fume-collecting slots, under parts bins, feed 160 fpm. per slot into exhaust system to carry off soldering gases

MERRY-GO-ROUND CONVEYS RADIO-CHASSIS ASSEMBLY

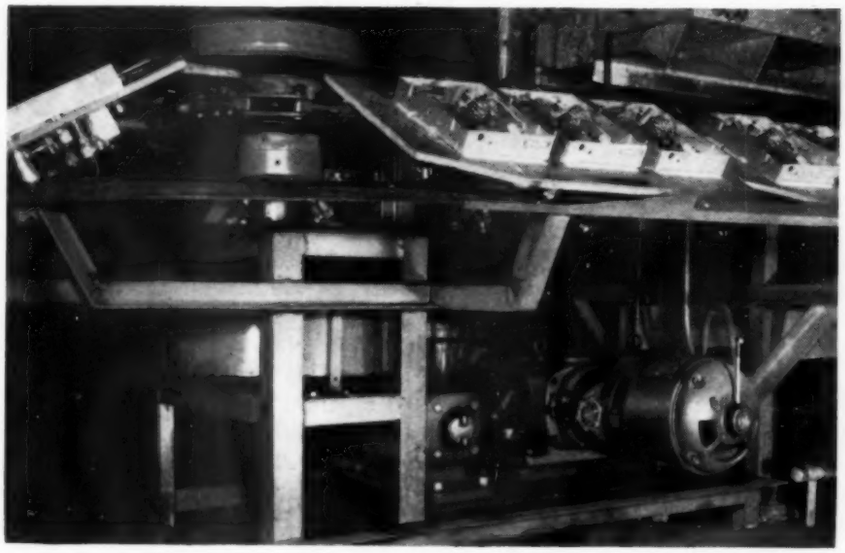
BY HENRY GILLIG, SUPERINTENDENT, STEWART-WARNER RADIO PLANT

Cut-out plywood fixtures ride on double-rail track in continuous cycle. Radio units are assembled, wired and soldered on the move

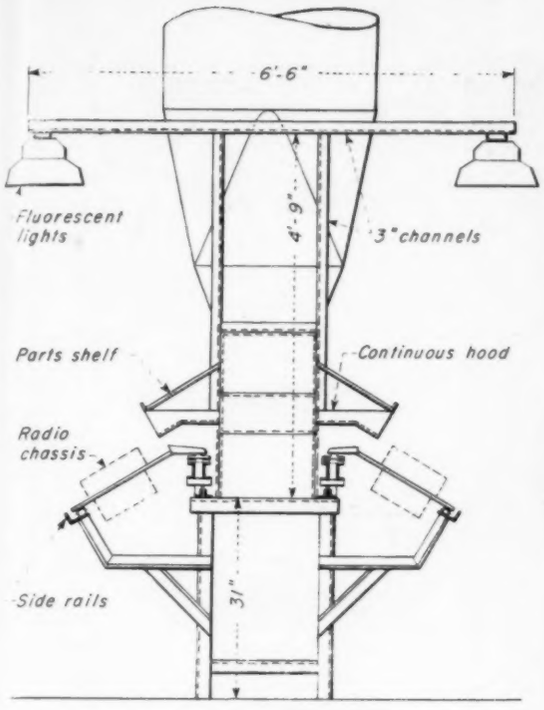
RADIO-CHASSIS assembly is timed at Stewart-Warner's radio plant by the spacing of ½-in. plywood fixtures along several merry-go-round conveyors. The chassis carriers are interchangeable boards, cut out to suit different models, and mounted on welded-steel frames that ride on two tracks.

A maximum of 74 work stations is available on each conveyor, although all are used for only the most intricate jobs. Each conveyor is timed in its motor-control circuit for a continuous work-and-rest cycle, commonly 14 minutes of wiring and soldering to one minute of rest.

The top of each fixture frame is bolted to a wear shoe connected to a link in the driving chain. This chain is guided and supported in a track channel. An angle-iron track supports the two ⅝-in. rollers on the lower side of each frame. Parts bins, atop the individual exhaust slots, hold small condensers, resistors and short wires.



Chain-sprocket drive, mounted under one end of conveyor, consists of flange-supported, 3-hp. electric motor, Reeves variable-speed transmission and double worm-gear unit. Speed ranges from 0.5 to 3 fpm., depending on chassis type



Merry-go-round frame is welded angle and channel iron. Outboard supports for lower track clear 8-in.-deep chassis, the largest. Drop-forged chain has 4.031-in. pitch, sprockets have 20.66-in. pitch dia. Continuous exhaust hood and light supports are mounted on frame

Cut-out plywood fixtures are loaded with chassis opposite final-inspection station after major components have been added at workbench at right. More parts are added and soldered in along the continuously moving conveyor

Hot electric soldering irons are held in steel-tube "holsters" mounted on the lower rail. Two are used alternately. Schematic drawings under lighting fixtures show operators the connections and additions to be made at their own stations

Solder spool is positioned at left of operator. Close spacing of chassis illustrates how they are located so operations can be timed for smooth work flow. Board carrying three chassis is 30 in. long by 20 in. wide

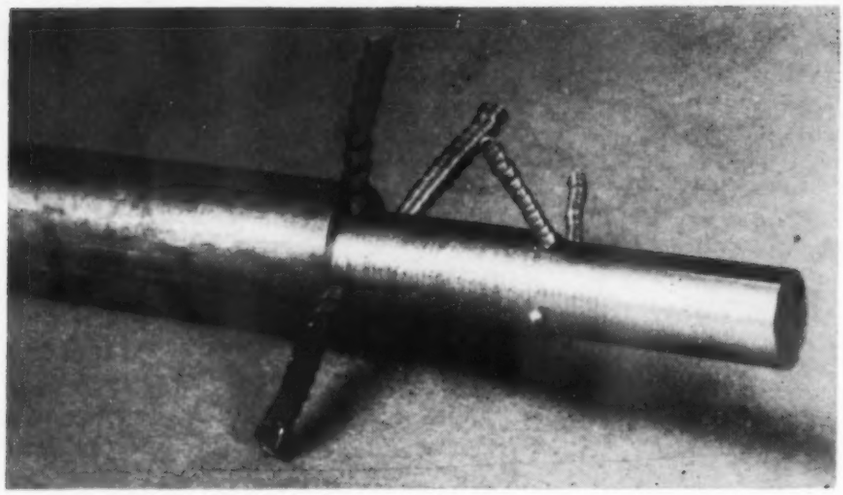
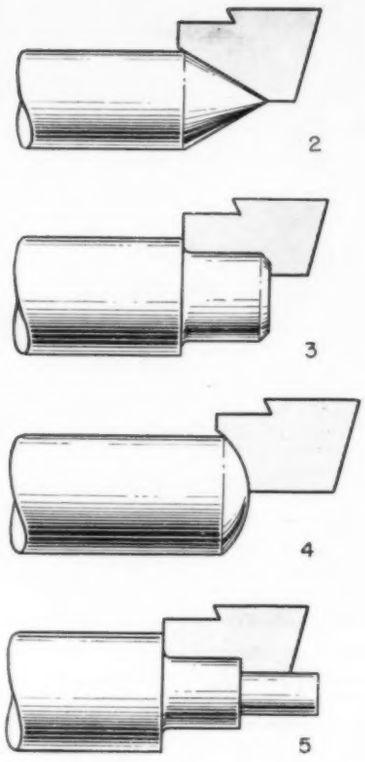


Fig. 1—Uniform distribution of chips is obtained, illustrating the advantage of four double-diameter cutters instead of one. Faster feed rate can be used



Figs. 2-5—Form and length of the turned surface are controlled by the step in the cutter, the step being constant for the length of the tool

DIEHEADS WILL TURN, FORM AND GROOVE

Dieheads are used extensively for turning as well as threading. In many instances, they replace box turning tools. Applications are made on a variety of work forms: solid shafts, tubular goods and small forgings

BY C. A. REIMSCHISSEL,
Chief Development Engineer,
LANDIS MACHINE COMPANY

TURNING cutters, as used in dieheads, are comparable to tangential chasers. When used in dieheads of the Landis type, they can handle a large diametral range of work. Cutting speeds depend upon machinability of the material, depth of cut, and finish, of course, and range from 30 to 70 fpm. The dieheads remain adjustable for diameter in the same manner as for threading.

Cutters have a long life, because only the rake angle needs grinding. And when cutters are replaced in the chaser holders, the cutting edges can always be positioned in the same relation to the center of the work. To decrease or increase clearance under the cutting edge, the cutting position is adjusted by advancing or retracting the cutters.

Form cutters of many types can be used in the dieheads. They can be used to produce a full point, Fig. 2, on bar stock or a partial point on sheared bolts or rods. Turning and chamfering the end of the work, a small forging, is done with a step cutter like that in Fig. 3. This type of cutter is used to turn forgings before threading or to turn forgings and bar stock to finished size.

A radius form is produced with a cutter like that shown in Fig. 4, whereas the tool shown in Fig. 5 has a radius at the front edge and a square corner on the second step and turns two diameters.

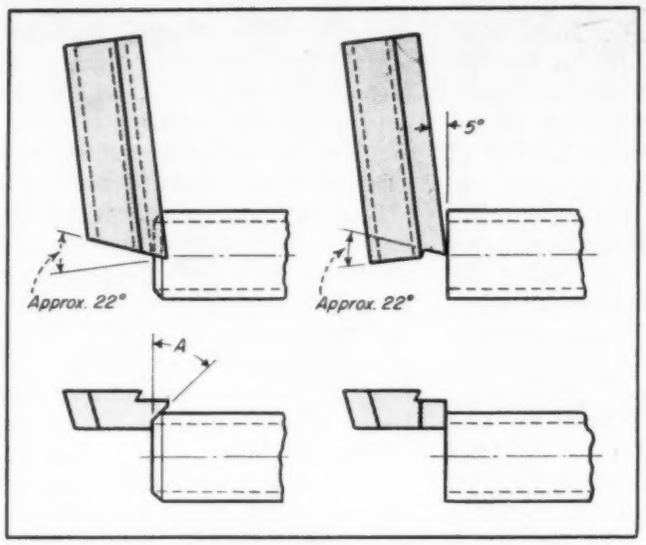
Tubular goods must be faced and chamfered for welded joints. The combination tool, Fig. 6, is used in regular pipe dieheads, but special chaser holders are employed to set over the tools 5° in order to obtain a minimum of 5° clearance under the cutting edge. Angle *A* is made according to chamfer requirements.

When the ends of tubular products are faced, a cutter like Fig. 7 is employed. Because this type of cutter cuts only on its front face, the holder must have an angle of at least 5° to establish clearance under the cutting edge.

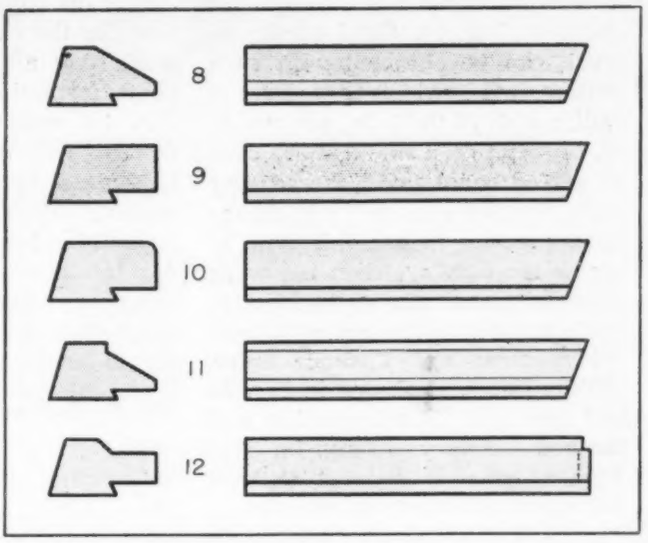
Standard Outline Tools

Most work with cutters in dieheads is done with standard outline tools. Certain precautions may be necessary.

When the standard outline tool, Fig. 8, is used only for chamfering, regular N.C. cutters can be employed. Cutting is then done exclusively on the chamfering angle, providing natural clearance, regardless of the helix angle of the chaser holder.



Figs. 6 and 7—Special chaser holders should be used to position these tools so that a minimum of 5° clearance is obtained under the cutting edge when facing, or facing and chamfering, tubular goods

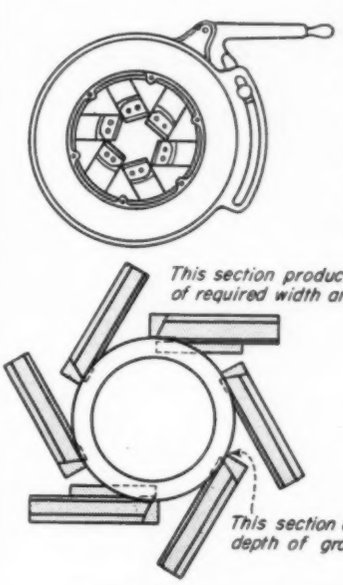


Figs. 8-12—Standard outline cutters are much used, but certain precautions are sometimes required with respect to chaser holders and feed rates. The cutter in Fig. 12 is for turning down shaft ends and for chamfering

But cutters illustrated in Figs. 9, 11 and 12 must never be used in a chaser holder with a helix angle of less than 5°, to provide clearance under the cutting edge. An exception may be noted in the case of Fig. 10. If the radius on the cutter is greater than the depth of cut on the work, this cutter can be used in a N.C. holder, because the radius would be similar to the throat on the chaser.

Because of its sharp corner and short life between grinds, the cutter shown in Fig. 9 is expensive to use. When finish must be maintained, employ a fine feed, equal to 40 to 60 threads per inch. Coarse feeds cause welding of metal to the sharp corner of the cutter and produce a rough finish.

Most efficient cutter for turning



OPERATION OF HEAD FOR GROOVING—Set head to size in regular way. Open head, and advance carriage to pipe until end of pipe comes in contact with stop blocks on grooving cutters. Head is then closed down by means of operating lever. This operation feeds grooving tool into pipe. When operating lever reaches extreme closed position groove is completed.

This section produces groove of required width and depth
Stop blocks control distance between groove and end of pipe.
Two stop blocks are used, opposite each other, in each set of cutters.
This section controls depth of groove

Stop blocks may be applied to any cutter: All cutters being machined to fit blocks. This provides for complete interchangeability of cutters.

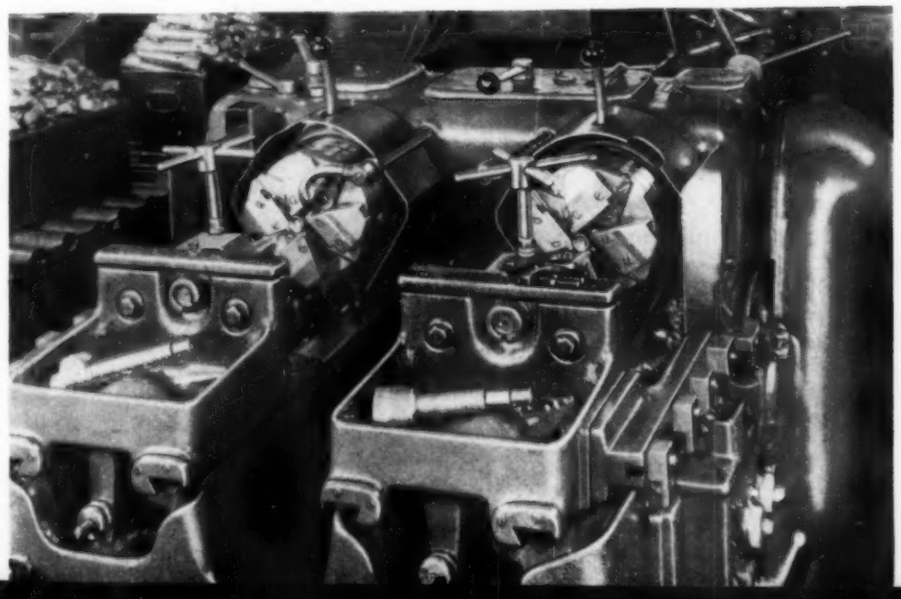


Fig. 13—Six tangential cutters of the type shown in Fig. 10 are held in special chaser holders while grooving Victaulic pipe at a definite distance from the end

Fig. 14—For mass-production quantities of parts like steering-gear shafts, it pays to convert the threading machine to hydraulic feed for the carriage. Feed rates are then preset for cutting conditions at various stages of the operation

steel is the standard outline cutter shown in Fig. 10. Good quality of finish can be obtained with such cutters, even when they have a radius of 3/16 to ⅜ in., remove ⅛ in. of metal on a side and are used at a feed equal to 12 threads per inch. For these reasons it is always good practice to use this type of cutter for turning when the work permits the use of a radius. Faster feeds and better finish are secured.

For grooving Victaulic pipe, cutters like that shown in Fig. 11 are specified. The operation and method are shown in Fig. 13. This type of pipe is coupled without threads, and the pipe requires a groove which must be uniformly held from the end of the pipe.

When a threading machine is used entirely for turning, it is essential to convert it to hydraulic feed for the carriage. Then, when machining a part like a steering shaft for automobiles, the setup, Fig. 14, enables variation of the feed to suit the machinability of the material and the finish required. When turning up against a shoulder, the feed can be reduced for the heavy cut of facing the shoulder, followed by a dwell to finish-face the shoulder without cutter marks.

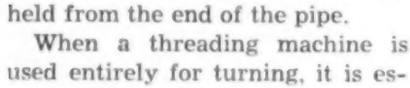
For High-Production Jobs

In Fig. 14, a fixture at the front of the carriage clamps the head of the steering shaft. A receding spring pilot is mounted in the bore of the head to center the end of the shaft with the diehead. As the work advances, the center recedes into the spindle. The carriage is operated hydraulically. Machines of this type are used mostly on high-production work, where the part quantities permit the equipment to be designed, set up and used on the one class of work.

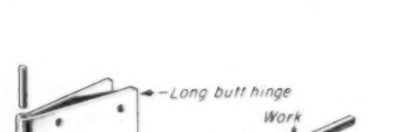
Less extensive modifications are required in leadscrew-type threading machines for lower-production jobs. For turning both ends of a lawnmower shaft, Fig. 1, cam-operated stops are employed. The feed for turning is obtained from the leadscrew and is varied by means of change gears. Double-head machines are employed when one end of the part is turned down and then threaded. One diehead is used for turning; the other for threading, thus performing two operations on one machine.

Short Cuts FOR THE SMALL SHOP

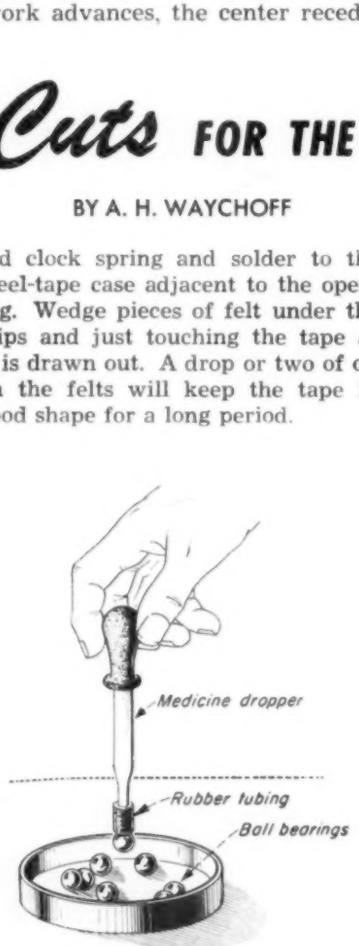
BY A. H. WAYCHOFF



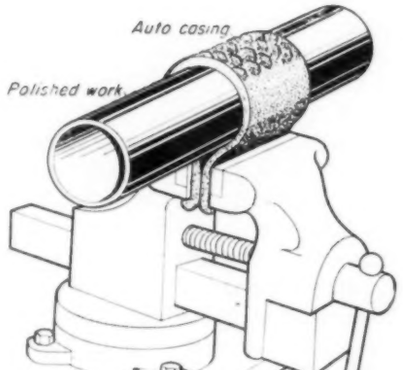
HINGE CLAMPS for welding work are easily made from long butt hinges. Form two V-grooves in the hinge halves to hold the work. Assemble as many modified hinges as needed onto a rod that replaces the hinge pins. Butt welds in rods are easily made, as shown, but a number of other setups will suggest themselves.



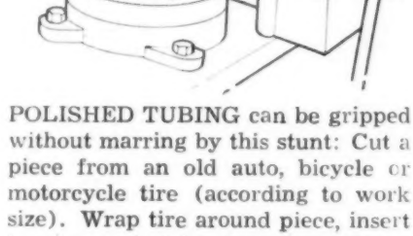
FELT OILERS applied to a steel tape will prevent it from rusting or binding and will not interfere with operation. Make a pair of clips of old clock spring and solder to the steel-tape case adjacent to the opening. Wedge pieces of felt under the clips and just touching the tape as it is drawn out. A drop or two of oil on the felts will keep the tape in good shape for a long period.



A MEDICINE DROPPER can be adapted to picking up small ball bearings that elude the fingers. Put a short piece of rubber tubing over the nozzle. Exhaust the air from the bulb, apply the tip of the tubing to the ball, release the bulb, and the suction will hold the ball until it can be placed in the desired location.



POLISHED TUBING can be gripped without marring by this stunt: Cut a piece from an old auto, bicycle or motorcycle tire (according to work size). Wrap tire around piece, insert in vise so that bead sections of tire come below the vise jaws, and tighten the vise.



TO AID in dressing down shims, tack a piece of old rubber tube on a board. When the file is applied to the shim, the pressure will force the latter slightly into the rubber, and hold the part securely.

TALKING SHOP

Light Metal—and Musical

LATEST ISSUE of the *Alcoa Aluminum News Letter* reports that 915 aluminum cars have been ordered since VJ Day, and that a missionary to India who needs a piano must have one with an aluminum harp. (The climate's tough on cast iron, they say—but we hear that in the South Pacific the worms eat up wood, so there the frame would have to be metal, too. Alcoa should meet some missionaries to the Fiji Islands.)

What Secrets?

WE'VE MENTIONED before that modern "trade secrets" leak out faster than the news about skeletons in the family closet. Recently, a large company furnished us drawings of a loader designed for a heavy machine tool. The chief engineer of the machine-tool plant, when he heard the print number, laughed fit to kill—it wasn't his number. The two letters preceding the figures in the number were the initials of the large company's major competitor.

That Bee Again

PACKAGING has been simplified at Willson Products by using Multigraph machines to print boxes. Because of the "fashion" element in safety goggles, they have an extremely wide variety of models. Boxes are bought cut to the necessary sizes, ready for folding and stapling. When an order is received, a copy goes to the shipping department and the boxes are Multigraphed with the appropriate label. It's attractive, cheaper, and saves a lot of storage space. When a man at Willson originally had the idea, they consulted the Multigraph people, who told them it couldn't be done. Guess Willson had heard the famous story about the bumble bee, because they went ahead and did it anyway.

Stainless-Steel Houses

WE HAVE HEARD a good deal lately about aluminum and enameled steel for building houses, but it took a pair of sparrows in Paterson, N. J., to build a house of stainless steel. Their nest was found in a tree overlooking a yard where a considerable amount of stainless turnings and scrap is dumped. The birds evidently found the strong, curly turnings ideal building material for a rust-proof home, as they interlock nicely . . . As a further step toward modernization, the inside was well insulated with scraps of down, leaves and other padding. After all, how would you like to sit on steel turnings without some protection?

Sound for Volume

SONIC VIBRATIONS, too faint to be heard by the human ear, inspect cavities of high-compression cylinder-heads for the 1948 "Futuramic" Oldsmobile. A new machine, called the Cavitometer, handles 150 heads per hr. Properly, it is electrosonic, using the pipe-organ principle that any cavity with a certain type of throat opening has a natural frequency at which it will resonate. Thus, the sonic wave from each head can be compared in turn with that of a master and the difference indicated as a volume measurement on a dial. The unit will register differences in volume capacities of one part in 1,500—thus is far more accurate than pouring a fluid into the cavity and measuring capacity in cc. by pouring into a graduated beaker.

Daffynitions

FOR YOUR FILE: INFLUENCE—what you think you have until you try to use it . . . EXECUTIVE—a man who can hand back a letter, for a third retyping, to a red-headed stenographer . . . SWEET ADELINE—The Bottle Hymn of the Republic . . . FRESH EGG—one that gets slapped in the pan . . . TIME—the stuff between paydays . . . PEDESTRIAN—the guy who missed a payment on his car . . . WORK—an unpopular way to make money . . . COCKTAIL—ice cube with alcohol rub.

Birth of a Notion

H. H. FRANKLIN tells us he started making die castings in Syracuse in 1893, under the name of H. H. Franklin Manufacturing Company. He got a gold medal for them at the Paris Exhibition in 1900, advertised die-cast gears in the Nineties. That's where and when the business started.

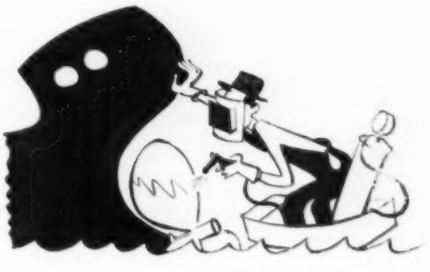
One Man's Opinion

A SHOP EXECUTIVE offers the opinion that modern tools are too light—not enough cast iron. Says he doesn't mind paying for the extra poundage because of greater rigidity and freedom from vibration. Backs up his opinion, too, by buying the heaviest machine tools (for their capacity) available.

Random Welding

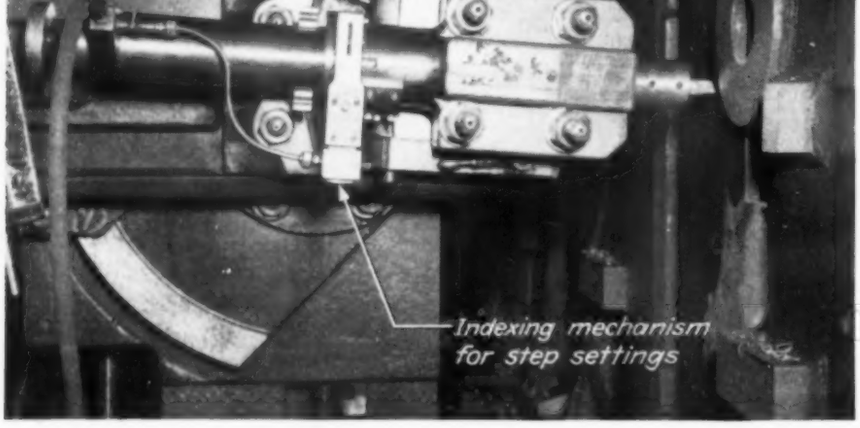
L. H. CANN, owner of the Cann Machine Shop, Louisberg. N.S., made newspaper headlines in Sydney, N.S., recently over a job he did the winter of 1947. Seems the 5,000-ton freighter *Random* cracked a propeller blade there in midwinter. The experts decided it was a drydock job—but a cracked wheel wouldn't push the *Random* through the ice. Mr. Cann disagreed, turned the cracked blade to the top and welded it from a raft. According to the newspaper accounts, marine officials predicted disaster from differential expansion during welding or from salt-water corrosion afterward. Neither developed, as proved by recent return of the freighter.

We'd guess the "welding" was really brazing of a steel insert into the bronze wheel, for the reporter also mentions a "new part cast at the Sydney Steel Plant," but the story tickles us anyway for the evidence of ingenuity. Mr. Cann didn't wait for his ship to come in, but adapted the classic postscript about rowing out to meet it.



NAVY DEVISES INGENIOUS PLANER AND BORING-MILL SETUPS

A jump-cut tool saves 15 hr. of setup and machining time per gun carriage because surfaces blocked by ribs or adjoining bosses can be cut at full table speed



After the tool leaves the circular boss it snaps back in 1/20 sec. to the proper plane for cutting the square pad. Shown is the modified design of jump-cut attachment, that will plane as many as nine steps

Gun Factory personnel work out manufacturing procedures that save time when jobs are run in any production quantity

BY RUPERT LeGRAND
ASSOCIATE EDITOR

As THE recent war proved to industry, the Naval Gun Factory at Washington has its share of good mechanics. This great sprawling 10,000-man "Yard", as it is called, produces ordnance of all kinds. In some periods, material must be made in quantities; in others certain shops are slack.

But, the attitude in the Production Engineering Section and in the shops too is:

1. Tool up to produce parts to exacting engineering requirements.
2. Do the work in as few setups as possible.
3. Save time on each operation.
4. Make the result practical for the use of a private contractor if an emergency requires the letting of large orders.

Examples of this policy will be explained in connection with the making of carriages for the Navy's new 3-in. 50-cal. anti-aircraft gun. Carriage components are weldments that are machined primarily on boring mills and planers. Equipment selection and modification, fixture design, and development of attachments are indicative of practices that can be applied by private industry to cut costs.

Jump-Cut Tool

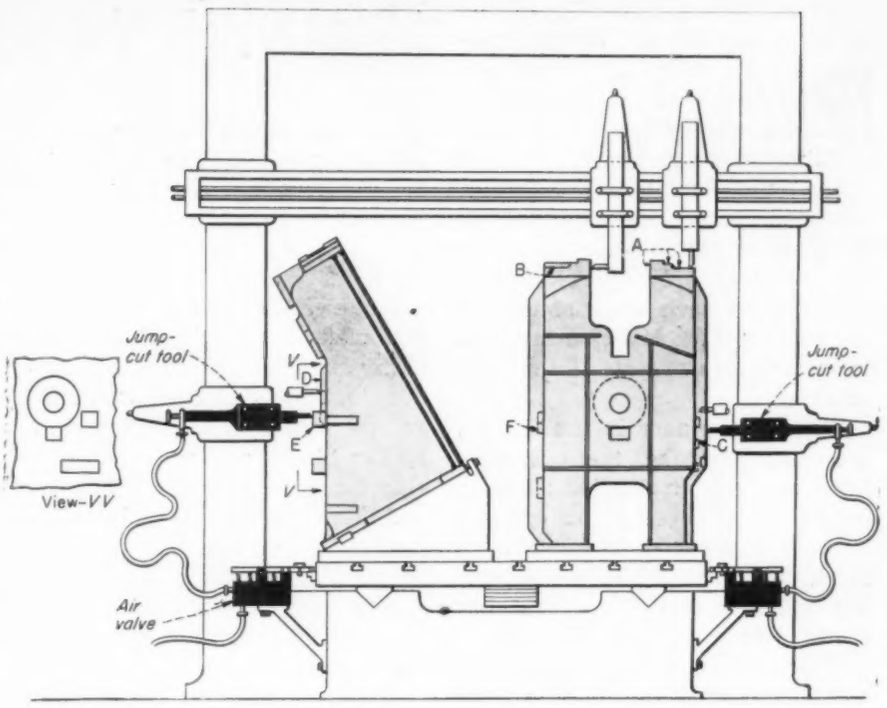
Obstructed cuts at various height, width or diametral locations on a workpiece can be planed or turned at full speed without danger of striking ribs or lugs, when using a jump-cut tool de-

vised by Quarterman Machinist Luther E. Lee. The Navy is taking out patent applications to protect Mr. Lee's rights.

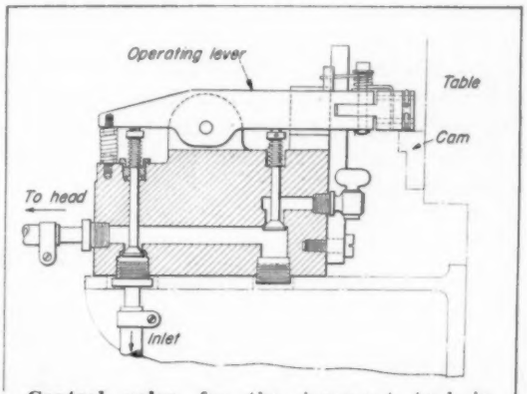
The jump-cut tool is an air-operated attachment for planers and boring mills and it can be made into a slotting head for cutting clearances, keyways and T-slots. When used on interrupted cuts, that is, pads or bosses at various heights, cams fastened on the machine table cause the head to advance or retract the tool in 1/20 sec. There is no danger of striking the tool against an obstruction, even if pads of unequal height are spaced as closely as ⅝ in. and the height difference is 2½ in.

By using the jump-cut tool, remarkable time savings are possible. The machine is used at full cutting speed suitable for the material, heavier loads can be carried, short stroking is not necessary, and additional setups are not required on other machines. Therefore, setup and handling time are sharply reduced, and cranes are not tied up.

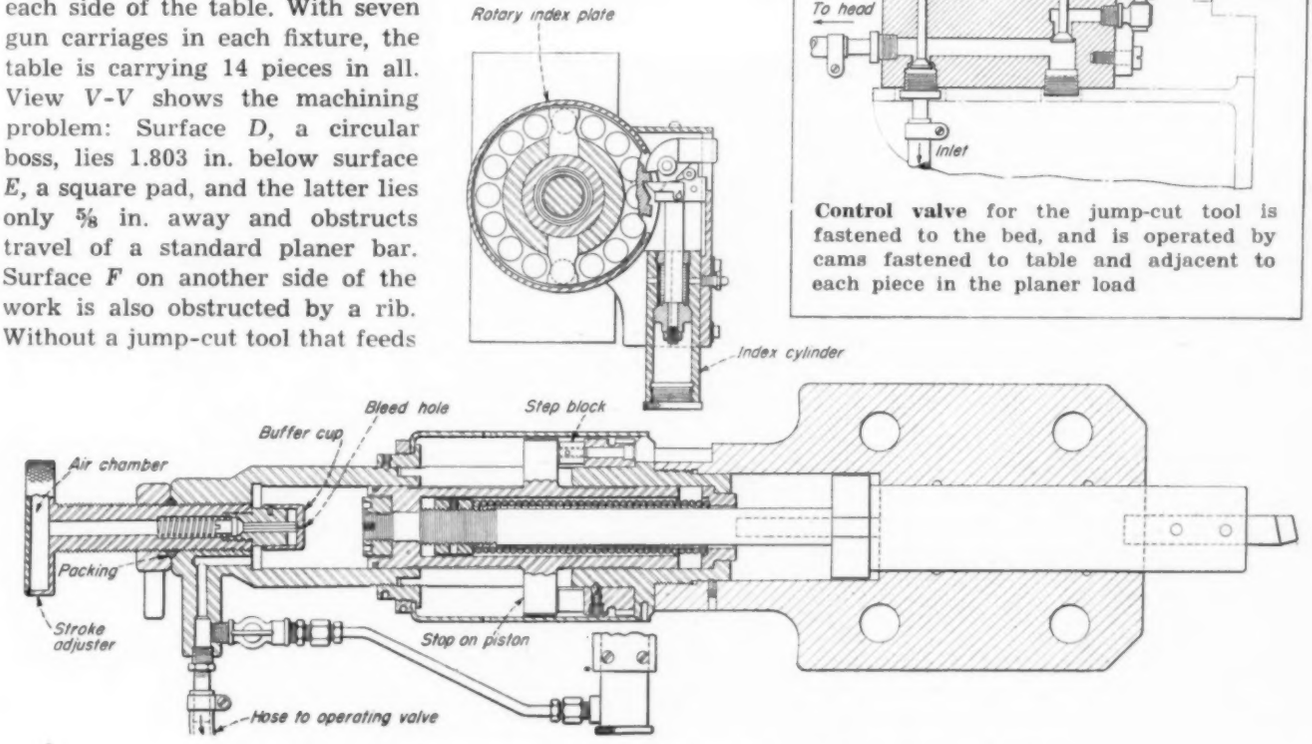
An application story will illustrate how the Naval Gun Factory has used the jump-cut tool effectively. An 86-in. planer is set up with two sets of fixtures, one on each side of the table. With seven gun carriages in each fixture, the table is carrying 14 pieces in all. View *V-V* shows the machining problem: Surface *D*, a circular boss, lies 1.803 in. below surface *E*, a square pad, and the latter lies only ⅝ in. away and obstructs travel of a standard planer bar. Surface *F* on another side of the work is also obstructed by a rib. Without a jump-cut tool that feeds



Machining problem on gun carriages involves planing surfaces *D*, *E* and *F* with the jump-cut tool and surface *B* with a cam-lifted tool. These four surfaces are obstructed by bosses or ribs



Control valve for the jump-cut tool is fastened to the bed, and is operated by cams fastened to table and adjacent to each piece in the planer load



Up to nine steps can be cut with this jump-cut tool. Rear position of tool bar, is governed by a stroke adjuster with a steel-cup pneumatic buffer; forward positions for various steps are controlled by step blocks set into index plate

in and out automatically to the different surfaces and does so rapidly enough to clear nearby obstructions, it would be necessary to machine these surfaces one piece at a time on a boring mill.

The jump-cut tool attachment consists of an air-operated tool bar fastened to the planer head and an operating valve bracketed to the bed. At each work station in the fixture, there is a cam fastened to the table to operate the control valve.

When the planer is running on the cutting stroke, the operating lever of the control valve rides up on the cam, causing the exhaust port to close and the intake to open. Air admitted to the actuating cylinder forces the tool bar forward to a positive stop and to cut the surface of the circular boss.

As the tool leaves the cut, the cam roller drops back on the cam. Intake port of the control valve opens, the exhaust opens and the tool is forced rearward by spring pressure. Now the tool bar is back in position to plane the pad surface 1.803 in. higher than the circular boss. *Note:* if anything should happen to the air supply, the tool bar immediately retracts to prevent a smashup.

These operations are repeated on each workpiece, as the respective operating cam on the table actuates the control valve. Satisfactory advance and retraction of the tool bar without jamming the tool against an obstruction is obtained at cutting speeds up to 74 fpm.

Up to Nine Steps

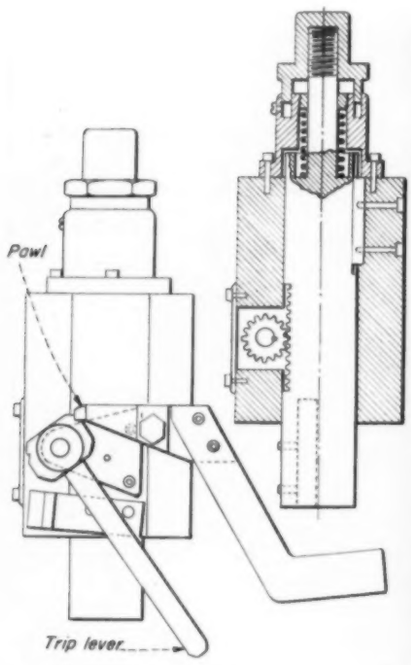
Modifications in the original design make it possible to machine as many as nine steps with the jump-cut tool. Added features are a rotary index plate that contains spacer blocks and a double-ended stop fitted crosswise into the piston rod. Step blocks, like end-measuring rods, are set into the index plate. The length of a step block determines the forward plane of the cutting tool for a specific step on the work.

Assume a step on the work has been cut. The cam drops into a depression in the cam plate, the control valve retracts the tool bar. Air actuates the indexing cylinder. By ratchet action the index plate with its spacer blocks is turned. When the cam profile admits air to the main cylinder, the pressure must build up to 25 psi. before spring pressure on the piston rod is overcome. Thus, the piston is cushioned as it moves forward, and the stop does not batter the step block. But as the pressure builds up, the stop is firmly held against the step block, so the tool cannot back away from the cut.

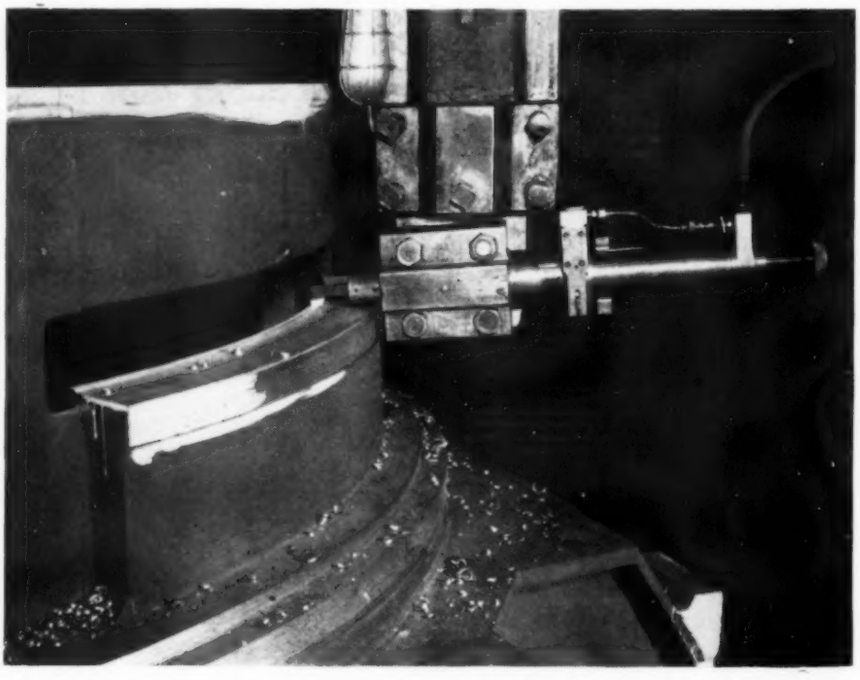
Another special planing head is used to machine surface *B*, which is obstructed by a shelf. A mechanical principle is used for this device. Rack teeth are cut into the spindle, which is backed up by a spring. And a trip lever is attached to the pinion shaft.

When the planer is running on the cutting stroke, the trip lever strikes a trip plate fastened to the workpiece at the proper distance ahead of the obstruction. The trip lever rotates the pinion, and the tool bar is pushed upward against spring pressure. As the trip lever clears the trip plate, the spring forces the tool bar down and the pawl catches a detent on the trip lever, positioning the tool firmly for the cut. Thus alternate raising and lowering of the tool bar occur at each workpiece.

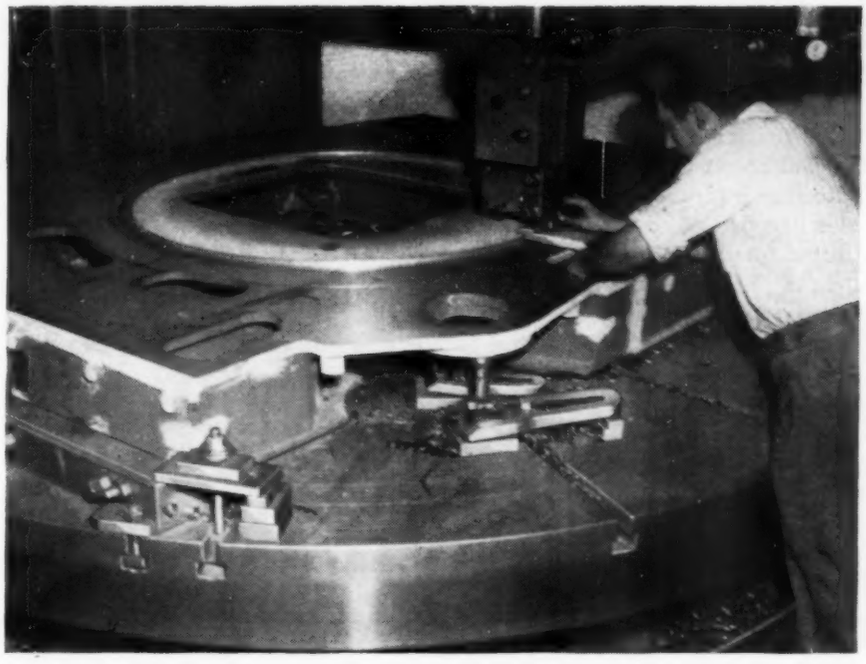
At the end of the cutting stroke, the pawl lever remains in engagement and the tool bar is held up in the housing during the return stroke. Before the next stroke begins, the pawl lever must be re-



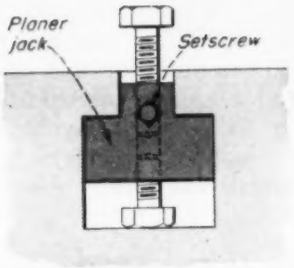
To lift the tool over a rib, the trip lever is raised by a trip plate fastened to the work. When lever clears the obstruction, the tool bar drops



An underslung face on circular work is easily reached by a jump-cut tool set up on a boring mill. The tool pops into the opening, cuts and withdraws before it can be smashed by the wall of the casting



Cut and try work in finishing the width of a circular slot is avoided by setting the tool to a gage with 0.003 in. feeler and indicator on rail to zero. Tool is now fed into cut until indicator again reads zero, setting gage is tried in slot and feed again engaged for 0.003 in.



Small planer jacks are permanently mounted in boring-mill table T-slots as shown. Jack screw is raised until dial indicator above overhanging section of work just begins to move

leased by hand or by a bracket on the machine.

Good Work Support On Boring Mill

If a weldment is set up right on a boring mill, the machined surfaces will be in correct relationship to the part centerline and to each other. This is the practice followed when facing the bearing seat and sinking a circular slot in the upper base ring of the 3-in. 50-cal. mount:

At layout, the weldment is leveled in an inspection, or equalizing fixture, and a centerline is scribed. Three center holes are drilled—two on one side, the third on the opposite side. After transfer to the boring mill, the part is located by two rails at opposite sides of the piece. One rail has two centers, the opposite rail one center. Raising screws in the rails lift the component until the three centers engage the three center holes.

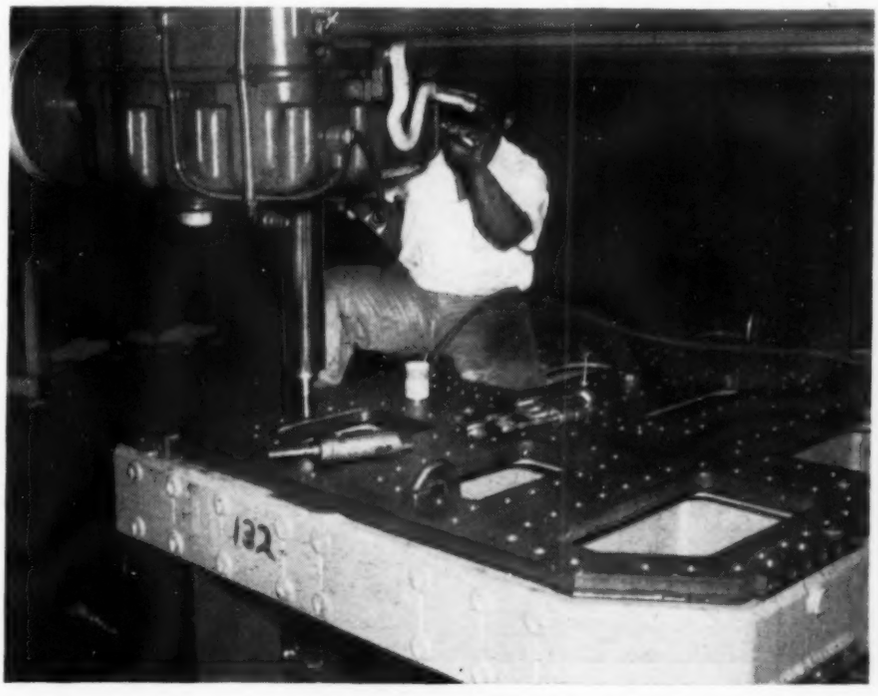
To prevent sag at other portions of the weldment, several small leveling jacks are permanently inserted in the table T-slots. The body of the jack is drilled and tapped to receive a setscrew which pushes the body firmly up into the T-slot. The jackscrew is raised until an indicator set to the top of the part begins to move. Then a setscrew in a cross hole is tightened to maintain the height setting of the jackscrew.

Facing is done with a broad-nosed tool having a carbide blade brazed in place. Cutting speed at periphery of the bearing seat is 650 sfpm.

To cut the circular slot to depth, a carbide tool with a ¾-in. wide insert is employed.

To finish the width of the slot, the setup illustrated is made. A loose setting gage with slot is applied to a tongue on a permanent fixture fastened to the table. The tool is brought up to the free end of the setting gage with a 0.003-in. feeler between. And a dial indicator clamped to the V-rail is set so that it reads zero with the spindle in contact with the rail head.

Now, the operator feeds out the rail head until the indicator reads



Holes are tapped, 350 in 11 hr., using piloted holders that enter the drillplate bushings. Holes range from ½ to 1¼ in. NC. When tapping a ⅜-in. N.C. hole, a spindle speed of 150 rpm. gives no trouble

zero. Next he tries the setting gage in the slot. If it fits he knows that the slot width is just 0.003 in. small. Thereupon he engages the feed and takes out an additional 0.003 in. This practice avoids considerable cut-and-try work in order to obtain the correct size of the slot O. D.

Drilling at Planer Setup

Considerable setup time, machine time and crane time are saved by drilling holes in one face of gun carriages after the five components are planed but while they remain set up on a planer table. Total time per piece—including planing, drilling and spot facing—is now 12 hr., as compared to 8 hr. for planing alone, plus two additional setups. Furthermore, 4 hr. of time for inspecting a planer load are saved by machining the parts to a templet and so accurately that they need no scraping.

Drilling is done with a portable Giddings & Lewis boring mill, which is set by the crane on a cast-iron floorplate adjacent to the planer. The boring machine is positioned by tapped holes and stops, and the spindle is aligned with an indicator.

The drillplate is located on the first weldment to a scribed vertical centerline and clamped. After the holes are drilled, an arbor is substituted for the drill and is run into a hole in the drillplate. The clamps are unfastened, the spindle backed away and the machine is traversed to the next piece. This practice saves waiting for a crane.

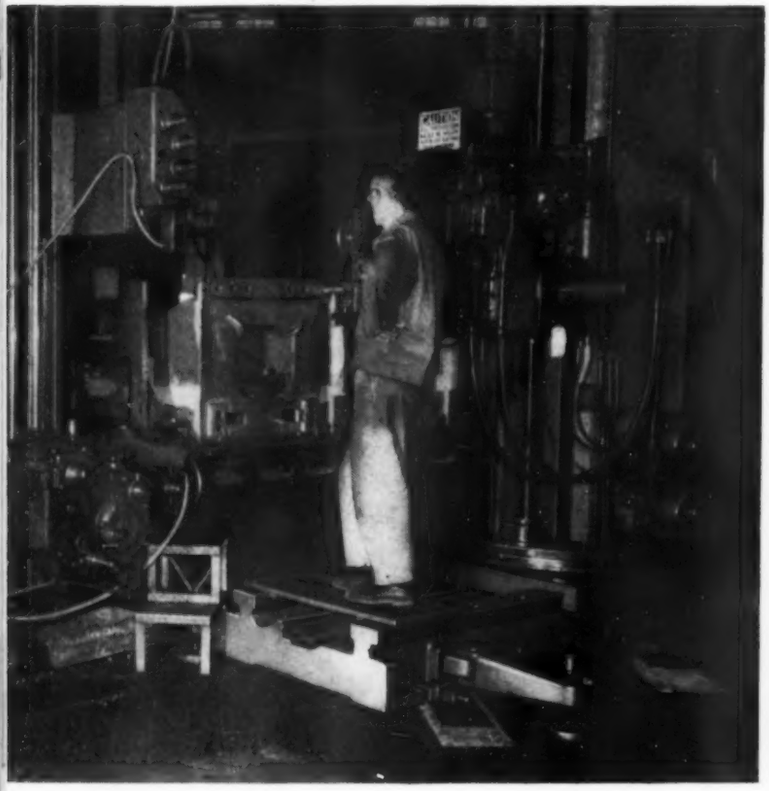
The use of a profile templet to which planer tools are set and the method of setting up the piece on the table are responsible for saving inspection time and avoiding the need for scraping. Before reaching the planer, the weldment is scribed for centerlines in an inspection and equalizing fixture. On the planer table, the piece is supported at three points so that the horizontal centerline is level. Also, planer jacks are put under surfaces that are likely to distort. These are brought up until an indicator just begins to move. By these means, the piece is planed true. For example, a keyway is held to plus 0.001 in., minus nothing, and the overall width to plus 0.003 in., minus 0.001 in.

Tips FOR TOP SHOP MEN

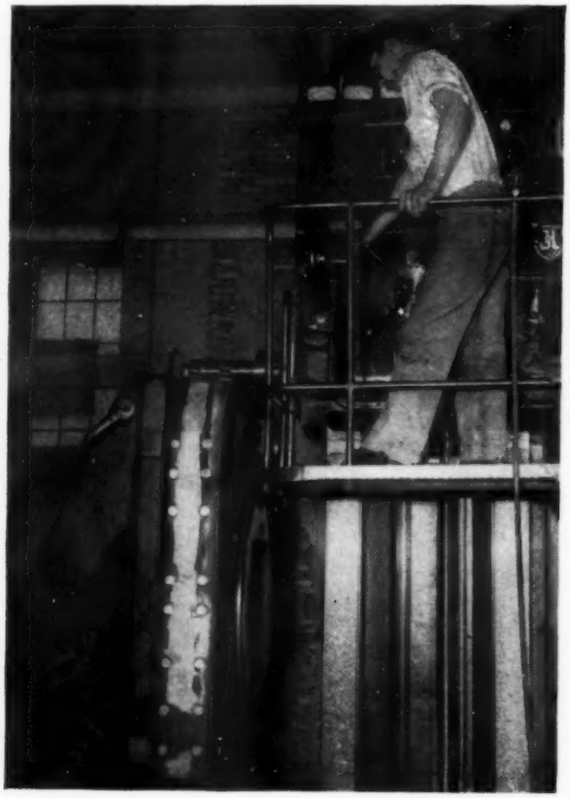
257 Be careful about discouraging the man who keeps you informed of what he's doing. Sure, he wastes your time by popping in at busy moments—but he also helps you keep in touch with what's going on.

258 Uniform wage scales or other factors may prevent you from recognizing individual merit in a financial way, but you can show your favorable opinion. Merit is still rare enough that it deserves recognition.

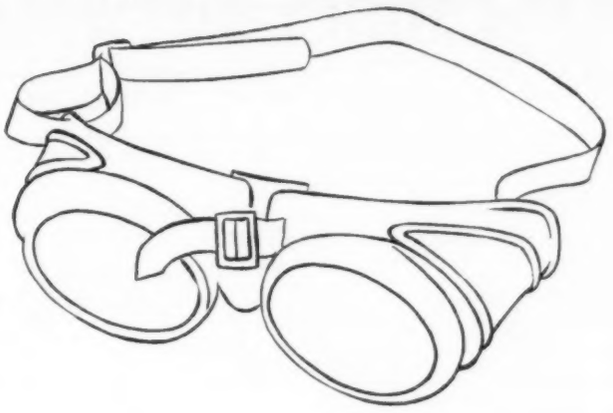
259 Keep your eye open for the man who does things he doesn't have to do. He's going places, and you can be the man who discovered him.



To drill holes in gun-carriage weldments, a portable boring machine is set up on floorplate equipped with locating stops. Additional setups and crane time are saved by this practice



Small bosses on sides and top of weldment are milled with same setup of piece as used for boring a 3½-in. hole and a 7½-in. hole to limits of plus 0.001 minus 0.000.



Modern Industrial Safety Equipment

BY ANDERSON ASHBURN, ASSOCIATE EDITOR

AMERICAN INDUSTRY is safe—safer than the home or highway—and it is for the most part getting safer all the time.

Despite this fine record, last year 17,000 men and women died in accidents that occurred while they were at work. More than two million more received injuries that disabled them for at least one day, and 90,000 of these were permanently injured.

These accidents cost American Industry and its employees 280 million man-days of production. The total cost of occupational accidents (not including fire) is estimated by the National Safety Council at more than two and a half billion dollars. Fire losses are estimated by the National Board of Fire Underwriters at $648 million.

This is an appalling cost whether it is measured in terms of lives or dollars. Improved safety records pay off equally in financial and humanitarian terms. In addition to the direct savings, there is an incalculable gain through reducing the damaging effect to morale and productivity which accidents have on workers who are not directly involved.

Certainly industry has not been remiss in developing safety equipment, and a bewildering array is available. But the accident rate is proof enough that it is not yet adequately and properly distributed and applied. The right equipment must be selected; then it must be used.

Toward this end, this report gives a concise summary of some of the principal kinds of industrial safety equipment and data on their application. Such information is available in various forms to safety directors and others, but this condensed report is intended especially for production men. They, too, need to know and understand this equipment in the knowledge that only safe production can be efficient production.

"Be careful . . . the life you save may be your own."

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

Copyright, 1948, by McGraw-Hill Publishing Co., 330 W. 42nd St., New York 18, N. Y.

CAUSES OF PERMANENT DISABILITIES AND DEATHS

CAUSE	ALL INDUSTRIES* NUMBER	ALL INDUSTRIES* PERCENT	MACHINERY	STEEL	SHEET METAL	METAL PRODUCTS	NON-FERROUS METALS
UNSAFE ACT							
Total Accidents	3,112	100	100	100	100	100	100
Unnecessary exposure to danger	796	25	25	27	20	21	31
Unsafe or improper use of equip.	467	15	19	15	21	13	13
Working on moving or dangerous equip.	428	14	13	15	13	12	9
Non-use personal protective equip.	275	9	7	9	6	7	9
Improper starting or stopping	284	9	12	8	3	12	10
Overloading, poor arranging	214	7	7	9	5	4	6
Making safety devices inoperative	157	5	5	1	9	8	4
Operating at unsafe speed	93	3	7	2	3	4	2
No unsafe act	398	13	9	14	20	19	16
PERSONAL CAUSE							
Total Accidents	4,818	100	100	100	100	100	100
Improper attitude	2,376	50	50	47	56	51	45
Lack of knowledge or skill	1,457	30	34	33	22	26	29
Bodily defects	102	2	1	2	1	2	2
No personal cause	883	18	15	18	21	21	24
MECHANICAL CAUSE							
Total Accidents	4,818	100	100	100	100	100	100
Hazardous arrangement or procedure	1,634	34	33	41	26	27	36
Improper guarding	1,214	25	22	22	36	24	21
Defective agencies	747	15	14	15	14	16	20
Unsafe dress or apparel	277	6	5	5	6	6	8
Improper Illumination or ventilation	32	1	1	1	**	**	**
No mechanical cause	914	19	25	16	18	27	15
Number of Accidents							
Unsafe acts	3,112		564	244	200	187	202
Personal and mechanical causes	4,818		800	449	295	303	291

**Includes information from industries other than those for which detailed breakdown is given*
***Less than half of 1%*
Source: National Safety Council analysis of reports by individual firms. A larger number of reports is available for personal and mechanical cause than for unsafe acts because the former data have been collected for a longer period of time. Data collected from 1937 to 1941.

Sources of Injuries

FOR THE most part, the trend of industrial accidents has been downward in recent years, both in frequency and in severity. This has come about not through any easy, universal formula of accident prevention but by studying the causes of accidents and gradually eliminating them.

As can be seen by the tables on these pages, the locations and causes of accidents are widely spread. Each plant should make a continuing analysis of accidents in an effort to prevent similar accidents in future.

Periodic, intensive efforts at reform are not generally effective. While campaigns, contests, and similar promotions can play an effective part in safety training, it is the steady effort to develop safe methods, and to select and apply suitable safeguards, that brings most effective results in the long run.

An example of how effective these results can be is the experience of the Ford Instrument Co., in reducing the cost of compensation for eye injuries (see graph) by studying eye hazards and developing suitable standards for goggles combined with an effective training program to get employees to wear the goggles.

Making the Plant Safe

THE FIRST consideration in industrial safety is to make the plant as safe a place to work as possible. This begins with plant layout and involves such factors as painting, lighting, heating, and ventilation.

Equipment must be kept in safe working order and proper guards must be supplied. First-aid and sanitary facilities must be adequate. Good plant housekeeping is desirable.

Then workers can be provided with such personal protective equipment as necessary, encouraged to wear suitable clothing, and trained to work and behave safely with reasonable assurance of success.

LIGHTING

Good light is just as essential in preventing accidents as it is in getting high operating efficiency. When natural light is properly applied, it is the ideal form of illumination. Any form of exacting work will require supplementary illumination when the distance from the window is more than twice its height.

Even under the best circumstances, artificial light will be required in most factories from 20 to 50% of the regular daylight shift.

Local lighting provides individual lights for each employee. General lighting provides a satisfactory level of illumination over the entire area. A combination of the two methods is frequently the most satisfactory.

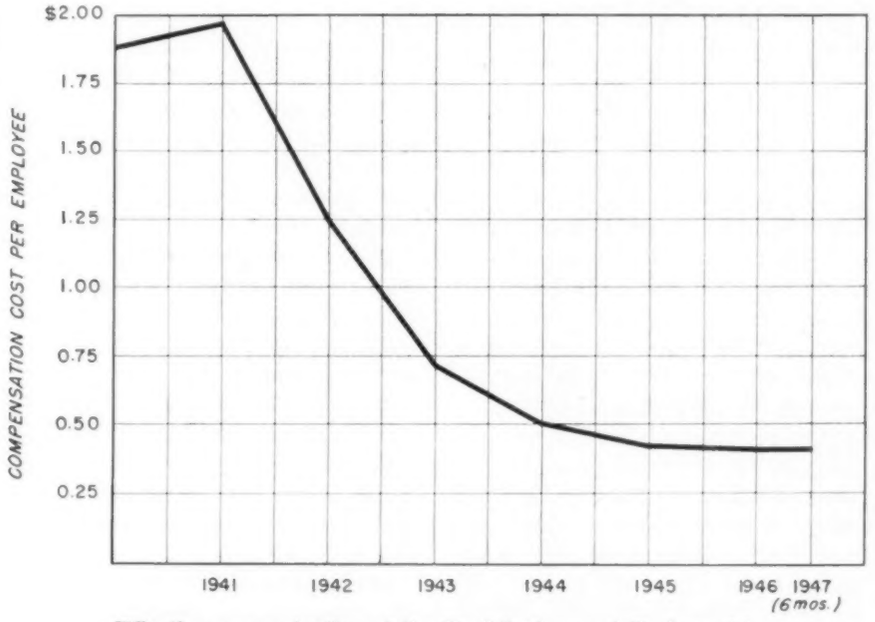
General overhead lighting may range from 5 footcandles in storage areas to 50 footcandles in working areas. For precision operations supplementary lighting should provide 100 footcandles, and extremely fine inspection may require 200 footcandles.

Location of machines in relation to windows is important. If operators must face large window areas, the glare is likely to be as bad as if bright, unshaded lights are in the line of vision.

When possible, machines should be placed so operators do not face window areas. When this is not practical the windows should be shaded or painted with a corresponding increase in the level of artificial illumination.

For effective, safe lighting these factors must be considered.

1. There must be an adequate level of illumination.
2. The light must be properly diffused, directed, and distributed.
3. Harsh, dense shadows should be avoided.
4. Glare should be minimized.
5. The light should be steady and free from objectional variations.



Effective eye protection at the Ford Instrument Co. brought this reduction in the cost of eye injuries. Prepared by Safety Engineering Service Bureau, American Optical Co.

SOURCES COMPENSATED OCCUPATIONAL INJURIES

SOURCE	PERCENT
Machinery	12.34
Punch press	1.15
Grinding wheel	1.03
Wood power saws	.91
Lathe	.80
Other	8.45
Vehicles	11.14
Motor vehicle	5.45
Hand and foot operated	2.35
Railway car	.86
Other	2.48
Working surfaces	9.51
Floor	3.08
Stairway	1.72
Staging and scaffold	.73
Other	3.98
Chemicals	6.54
Molten metal	1.00
Other	5.54
Hand tools	6.15
Knife	.80
Hammer	.73
Other	4.62
Hoisting apparatus	1.49
Hand power tools	.95
Conveyors	.85
Elevators	.53
Electric apparatus	.43
Pumps and prime movers	.35
Mech. power transmission apparatus	.13
Boilers and pressure vessels	.12
Miscellaneous	49.47
Metal sheet, plate, rod, etc.	8.60
Box, bench, chair, table	3.46
Bricks, rocks, stones, etc.	2.90
Lumber and woodworking material	2.43
Ladder	1.76
Nails, spikes, tacks, etc.	.79
Dust, foreign particles (eyes)	.78
Other	28.75
Total	100.00

Source: National Safety Council, based on reports from New York, Ohio, Pennsylvania, Wisconsin

6. Maintenance schedules should be maintained consistently.

7. Cleanliness and painting of interiors, including machinery, in functional colors, contribute to good lighting.

A detailed study of plant lighting is contained in the Special Report, "Lighting for Production" (*AM*—Aug. 29, 1946).

PAINTING

Proper use of color on walls, machines, and other equipment contributes to plant appearance and efficiency. It is also a factor in safety.

An effective color program for machines calls attention to danger areas. Stationary parts are best painted a quiet color of medium light reflectance. Moving parts should be a color in strong contrast. Light buff is particularly good when working materials such as aluminum, chrome, nickel, rubber, steel and tin. Light green is considered best for brass, copper, bronze, wood, and similar materials.

Oil-resistant, washable machinery paint of the gloss or semi-gloss type is recommended for painting machinery. The surface can be wiped off easily with waste or cleaned with kerosene, gasoline, or safety cleaners. Freshly painted machines encourage the operators to keep them clean.

Color is especially effective in calling attention to hazards and in identifying vital equipment. Unfortunately, there is not yet a universal color code for such marking. The code developed during the war by the American Standards Association, shown on this page, is the most generally accepted.

Piping should also be marked by color. To avoid a circus effect, the piping can be painted to match the surrounding area, with couplings, valves, and bands painted in the color code. The code on this page is generally accepted. It was developed by the American Standards Association, National Safety Council, and the American Society of Mechanical Engineers.

A detailed study of color applied to metalworking is contained in the Special Report, "How to Use Color in the Shop" (*AM*—May 9, 1946).

SAFETY COLOR CODE

RED — Fire protection equip. Danger. Stop buttons on machines, stop signs

YELLOW — Caution. Marking physical hazards, such as platform edges, columns

GREEN — Safety markers. First-aid equipment

BLACK & WHITE — Traffic markers. Housekeeping

VENTILATION AND DUST CONTROL

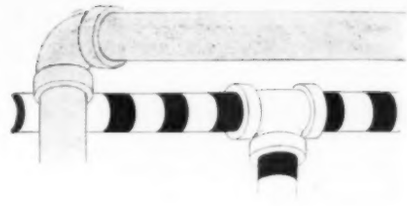
Keeping the plant supplied with fresh, clean air may be a difficult problem, but it is essential. Some air contamination may be toxic, leading to high compensation costs. In other cases it may only be unpleasant, without being harmful, which will cause discomfort that results in lower efficiency and a high labor turnover.

First requirement is to measure the type and amount of contamination. When this has been done, control measures can be developed. The National Safety Council lists seven principles of control:

1. Process revisions
2. Isolation or inclosure
3. Ventilation and exhaust
4. Personal protection
5. Sanitation and housekeeping
6. Periodic physical examination
7. Supervision and training.

Revising the process is one of the most effective methods, when it is practical. It may be possible to substitute less toxic materials or use wet methods instead of dry.

Operations in which toxic or unpleasant conditions cannot be avoided should be in confined areas. Walling them off from the rest of the plant not only keeps the general plant air uncontaminated but also simplifies the problem of exhausting the contaminated air.



COLOR CODE FOR PIPING

RED	Fire protection
BLUE	Protective materials, other than fire
PURPLE	Materials of extreme value
GREEN, GRAY, BLACK & WHITE	Safe materials
YELLOW, ORANGE, ORANGE & BLACK, YELLOW & BLACK	Dangerous materials

Control in these areas may be by general or local methods. Either natural or artificial general ventilation can be employed if it will keep the contamination below acceptable limits.

Local exhaust systems are the most important, however, and must be installed for more severe conditions. Hoods must be designed and placed at the point of contamination to inclose the process as completely as possible. The better the hood, the less air velocity is required.

Hoods may be in the form of booths, canopies, lateral hoods, downdrafts through grills below the process or slot-type hoods with high-velocity air flow.

For most operations, exhaust piping may connect the hoods to a central exhaust fan. Ducts should be designed to distribute air flow as required and should not be adjustable.

Ducts must not have sharp turns. They need cleanout gates at the bottom of vertical sections and at intervals on the bottom of horizontal sections.

Dust can be removed from the air by cyclone collectors, by filters, by water spray, and by electrostatic precipitators. Cyclone separators are often used in combination with filters.

With certain kinds of dust which are flammable or explosive, a central duct system is unsafe. With such materials, the hoods should

be connected directly to equipment for removing the dust, usually by water spray.

MAINTENANCE

Only authorized persons should be permitted to oil and service machinery. The machine should be provided with a means to lock it out of service during repairs. This should always be done and a tag should be prominently attached to the controls.

All portable ladders, except step-ladders, should be equipped with non-slip bases or ladder shoes unless the bottom is to be tied or held in place. On highly polished floors it may be advisable to use shoes on the front section of step-ladders.

Ladder shoes are made of molded rubber, metal plates, with wheel spurs, and metal plates surfaced with abrasive cork, rubber, or some other gripping material. In addition to the safety gain, ladder shoes add to the life of the ladder by preventing rounding off and splintering of the legs.

Wood ladders should never be painted, as paint will hide defects. They can be coated with linseed oil, shellac, or varnish. Portable ladders should be placed with the base one-fourth the distance to the top support from the vertical plane of the top support.

FLOORING

Floor construction and maintenance are vital factors in safety. Many accidents result from falls caused by worn floors, tripping over objects, or slippery spots caused by oil or other material.

An industrial floor should be strong enough to carry four times the expected static load or six times the moving load. It should be durable, easy to maintain, and should not grow slippery with wear. Fire resistance may be a decisive factor in some buildings. A floor with resilience and low heat conductivity is more comfortable and less fatiguing. In some plants noise absorption is an important factor.

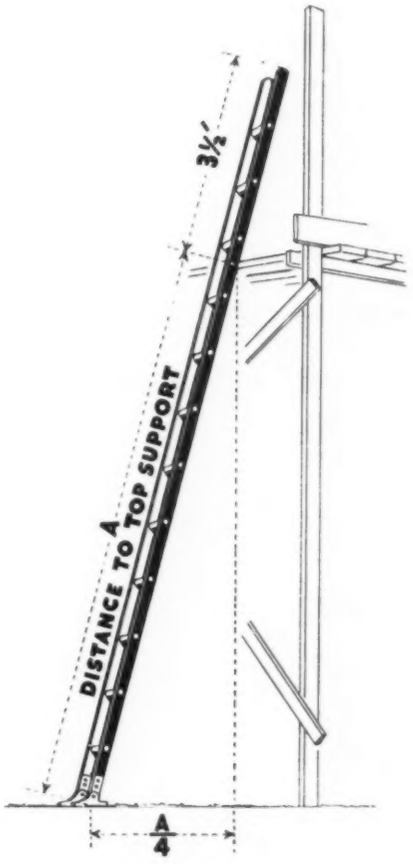
Concrete is an economical material suitable for many plants. It works well in damp locations, is easy to clean, and can be made non-slip by adding pea gravel or abrasive dust when the floor is laid.

Surfacing compounds are available which will make a concrete floor conducting and non-sparking. They contain a non-ferrous metallic aggregate and improve wear resistance.

Concrete is an uncomfortable material, but this can be overcome by using rubber floor mats or wooden platforms in working areas. Mats should be recessed to be level with the surrounding floor or beveled on the edges.

Asphalt can be applied over a non-rigid base and will stand up under heavy traffic. It is not resistant to oil, acid, or alkali materials. Plastic floor materials are more expensive but resist these materials.

Wood planks of hard, close-grained wood are suitable except where there is heavy trucking. Wood blocks secured in hot tar on a concrete base are extremely popular. They are durable, comfortable, and quieter than many other types of floor. Maintenance is simplified because sections can be replaced economically.



Ladders should be placed so the base is one-fourth the length to support from the vertical line of support. The top extends 3½ ft. above the support

Steel floor plates are often employed for platforms, walkways, floors, hatches, over ducts for utilities, and in other locations. If kept clean, they are not slippery until worn smooth. They can then be roughened by welding beads of metal on the surface, or they can be replaced.

Tile, terazzo, and similar materials are suitable for washrooms.

If a finish is applied to the floor, it should not be too slippery for safety. Paints which incorporate an abrasive give a non-slip surface.

Oil-absorbent compounds are effective for removing oil and grease patches and will prevent slipping. These compounds are non-combustible and generally more satisfactory than sawdust, rags, or waste.

Floor machines are valuable in cleaning industrial floors. With such machines, it is possible to scrub, dry clean, wax, and polish as may be required for a particular floor. Wire brushing will remove crusts of dirt, oil, and chips.

Aisles should be marked with painted lines. White is the preferred color. Marked aisles are more likely to be kept free of obstructions.

MACHINE GUARDS

There is much more thought given today to safe operation in designing machinery, and late-model machines are more likely to have suitable built-in guards. Under the best circumstances, however, additional guards may be needed on a machine when it is installed. On press operations it may be necessary to change the guard arrangement whenever the press is applied to a new operation.

Guards can be divided into two classes: power-transmission guards and point-of-operation guards.

POWER TRANSMISSION GUARDS

Modern machine design and the widespread use of individual motor drives has greatly reduced the

need for guards installed by the user. Guards should be provided where necessary to protect the operator from moving parts such as gears, belts, pulleys, flywheels, and chains and sprockets.

The guards may be built as inclosures, covers, or barricades. They can be made of sheet metal, cast metal, expanded metal, woven wire, perforated metal, wood, rigid fiber board, safety glass, or plastic.

If overhead drives are still employed, they should be provided with trough guards above passages or work areas.

Guards should be designed for easy access for lubrication or repair. The most desirable arrangement for this is a hinged guard.

Guards or covers inclosing high-tension electric equipment can and should often be equipped with interlocks so that access cannot be gained unless the current has been cut off.

POINT-OF-OPERATION GUARDS

Guarding the point of operation is usually more complicated than power-transmission guards. Guards should be installed at points where cutting, shaping, or forming is performed, at "nip points", or other hazardous locations.

As with most safety equipment, an inadequate guard is worse than no guard at all. It builds a false sense of security that may lead to an accident.

Setscrews on revolving parts should be countersunk; exposed keyways and protruding keys should be guarded. Nip points at the inrunning side of rolls should be made inaccessible by fixed barriers or protected by instantaneous body contact-actuated cutoff switches with automatic braking.

An abrasive wheel should be guarded with a strong metal hood, and equipped with a close-fitting workrest and safety-glass shield. These shields are available with lights built into the frame to illuminate the work.

Guards should be designed so they do not impair operating efficiency. Guards that cut production are likely to be discarded.

PUNCH-PRESS GUARDS

For punch-press work, the following methods of protection are common:

1. A ⅜-in. maximum stroke of the press ram.
2. A complete inclosure of the front and two sides of the die.
3. A gate guard.
4. A pull-out guard.
5. A horizontal-action sweep guard.
6. A vertical-action sweep guard.
7. A two-hand trip.
8. A two-pushbutton or finger trip.

For most press operations, the inclosure-guard is the safest that can be employed. Because some form of feeding and ejecting mechanism must be built before an inclosure guard can be applied, an increase in production is frequently gained. Inclosure guards can be built into the dies, but usually are adjustable guards. These can be purchased in standard types or built to fit the job.

When an inclosure guard is impractical, some type of mechanical guard is desirable. A gate guard is one that descends to a lower position when the clutch pedal is tripped. When it is properly adjusted the gate will not descend completely unless the operator's fingers are out of the danger zone and the clutch itself is not actuated until the guard has reached this position.

A pull-out guard has ropes or cables attached to the press ram and to the wrists or elbows of the operator so that when the ram descends the fingers will be pulled out of the danger zone. This type of guard should be inspected frequently and adjusted when a new operation is set up or a different operator starts to work on the press.

Sweep guards are connected to the ram of the press and sweep across the danger area as the ram descends. They are available in both vertical and horizontal types. Such guards should be adjusted so they cannot pass over the operator's hand or arm. They should not pass close enough to bolts or other parts to create a hazard. A shield on the trailing edge will reduce the chance of the operator reaching behind the guard into the danger area.

Two-hand trips operate the ram only when both are operated and are placed so one hand is required for each button or lever. This type should be made so it is impossible to actuate the clutch unless both levers are returned to neutral after each cycle. There have been many cases of operators tying down one lever and operating the press with the other. Two-hand trips should not be used when the speed of the ram is slow enough to permit the operator to put his hands into the danger zone after pressing the levers. Buttons can be designed so the press ram is stopped if either button is released before the ram reaches the bottom of the stroke.

When a large press requires more than one operator, two buttons should be provided for each operator, connected so the cycle will not start until all buttons are pushed.

Presses should be located so one operator will not interfere with another. Ample aisle space for materials handling is essential. A crowded operator is in a dangerous position.

SAFE DIE DESIGN

It is advisable to cut away all unnecessary metal, especially on front and sides, when making press dies. Cutting away the front of the upper die at a 45° angle will decrease the danger and permit the operator to see the work better.

When setting dies or adjusting a press, always disconnect the power. If line drive is provided, throw the belt off the pulley. Safety blocks of magnesium are available which can be fitted under the ram as an extra precaution when fitting dies.

A detailed discussion of press guards is "Punch Presses Can Be Safe" (*AM*—July 3, 1947). Methods of loading presses and machine tools are an important factor in safe operation. They are covered in two Special Reports, "How to Feed Presses" (*AM*—Nov. 20, 1947), and "Work Loaders Applied to Machine Tools" (*AM*—Mar. 11, 1948).

Personal Protection

EVEN with every effort to make the plant safe, there will still be many jobs which will require some personal protective equipment for the workers. This equipment must be approached with a somewhat different attitude from that applied to other plant purchases.

Personal protective equipment is *worn* by the employee it protects. A man may be perfectly willing to use a wrench drawn from a toolcrib but may object strenuously to wearing a dirty pair of goggles hanging beside a grinding wheel.

Whenever possible each employee should have his own protective equipment. Whether this is furnished to him, or is purchased at his own expense, will depend on the type of equipment and the nature of the job. For example, it is customary for the worker to buy his own safety shoes, but a respirator would be furnished by management.

The personal nature of this equipment introduces an element of style, even of fashion, into protective equipment. The makers of personal protective equipment have recognized this and provide a far wider assortment of styles than would be required from the standpoint of utility.

It is well to bear this in mind in selecting personal protective equipment. It may be possible to let employees take a hand in choosing the equipment purchased. If not, there should be reasonable evidence that they will like the style selected.

For example, the wide application of plastic goggles can be laid in part to the fact that they are fashionable. Though the initial cost is about the same, the maintenance is likely to be higher. However, their light weight and comfort are appealing. If workers wear them more consistently in jobs for which they are suited, the saving in compensation will more than offset any extra cost.

In short, in selecting personal protective equipment it makes financial sense to cater to the preferences of the employees.

EYE AND FACE PROTECTION

It is not enough to give a man goggles to wear. A complete eye protection program involves much more. Most plants have some form of goggle program today. Yet in the State of Pennsylvania in the first seven months of this year there were 1419 eye injuries in metalworking plants.

Even a complete goggle program is not enough. Eyes are vital in nearly all jobs. If his vision is poor a worker's efficiency is lowered and he is also more likely to cause or become involved in an accident, not necessarily one causing an eye injury.

Eye accidents are the most costly type of injury in terms of compensation and are probably the most damaging to the morale and efficiency of other workers.

A complete eye protection program should involve not only the study of eye hazards with provision for the appropriate protective devices, but also a means of locating and correcting visual defects.

Welder's shields may be built with a hinged filter lens that can be lifted for setup work

The following case is drawn from the files of the National Association for the Prevention of Blindness:

". . . he told me he would have to remove that particular lathe operator because his work was not up to standard and he was slowing up. I noted that, although about 50 years old, he wore no spectacles. When asked, he admitted he needed spectacles but, due to illness at home, he was not able to purchase them. At the foreman's suggestion he had his eyes examined and brought in a prescription. We purchased a pair of safety spectacles for him which cost the company $6.68. Ten days after this workman had received his safety spectacles his foreman called me and announced that this workman had almost doubled his daily production, and, what was equally important, not one piece of his work had been rejected in those ten days."

That $6.68 was a good investment. The unfortunate thing is that it was mere chance that this one workman's vision was corrected.

It is desirable to have tests for visual acuity and other visual functions—coordination, color discrimination, depth perception, and others—as part of the regular hiring procedure.

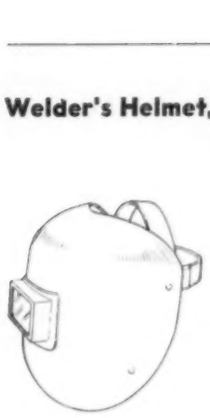
A good program should include a recheck at least once a year. Certainly periodic examination should be made of workers exposed to special hazards, such as radiation (welders) or toxic fumes. Examination should also be made of those with poor production records, those involved in accidents, and those in whom the original screening indicated a need for follow-up.

Eye examinations and corrective prescriptions should be made by a specialist who is familiar with the plant operations and can prescribe, where necessary, with the particular man's job in mind.

Dr. Hedwig Kuhn cites a case in which a large plant hired an eye physician to prescribe (in his of-

EYE-PROTECTIVE EQUIPMENT

Welder's Helmet, Dark Filter



For heavy gas welding and for heavy and medium electric arc welding and cutting. Has a dark shade filter with clear-glass cover-plate to protect the filter. The filter lens may be hinged so it can be lifted without raising the front shield. May be equipped with a front apron for overhead work and a rear apron or hood for use by women or when welders are back-to-back or one above the other.

Welder's Hand Shield, Dark or Medium Filter

With a dark filter for supervisors, inspectors, or visitors (but not for welders) on heavy gas welding and for heavy and medium arc welding or cutting. With medium filter for gas cutting.

Cup Goggles, Medium Filter

Fit the face contour to protect eyes from radiation in medium and light gas welding, gas cutting, and light arc welding. Also for workers exposed to glare and heat of molten metal. Clear glass cover plates protect the filters.

Cup Goggles, Light Filter Impact-Resistant

For protection when glare is the principal hazard but there is no radiant energy. Suitable for work with small masses of molten metal, for supervisors and inspectors on medium gas or light electric welding, and for workers near welding operations where protection from stray light is required. Protects from flying objects.

Spectacle Goggles, Light Filter Impact-Resistant

Made with and without side shields for glare protection (but not radiant energy). Protects from flying objects from the front or side (if equipped with side shields) but not from above or below. For use in foundry and furnacework involving light exposure, and by arc welders under their helmets for protection when the hood is raised.

Cup Goggles, Impact-Resistant

Protects from flying particles, splashes, or dust. When equipped with perforated side shields protects from large or small particles. With indirect vents also protects from splashes and is suitable for pickling, plating, foundry work and similar hazardous operations.

Spectacle Goggles, Impact-Resistant

With or without side shields. Protects from front or side (with side shields) impact. Suitable for most machine operations and many other light hazards; suitable for supervisors, inspectors, clerks who must go into the plant, and visitors.

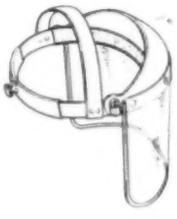
Plastic Goggles

Plastic goggles with a single sheet of plastic, curved or flat, provide adequate protection for machine work, spot welding, and similar operations. They are made with ventilated or non-ventilated frames.

Plastic Spectacles

Single sheet of plastic curved to face contour usually has brow and nose rests. Suited for inspection, light grinding, spotwelding and similar work. Extremely light in weight.

Face Shields



Curved plastic sheet covers upper part of face and extends down to lower tip of nose or below. Stands away from face so that it does not fog readily. Provides protection from small flying particles and may be used for grinding, chipping, soldering, spotwelding and similar work. When tinted, face shields provide ideal protection for spot-welding.

fice) glasses for 200 employees. Most of the workers, aged 17 to 20, were nearsighted and most had never worn glasses before. The work distance happened to be 8 in. straight ahead for these workers. The glasses, with conventional correction, caused real trouble.

Such expensive, and possibly dangerous, mistakes are avoided if eye examinations and prescriptions are made by doctors with adequate understanding of the local conditions. In some areas, doctors can be found who have specialized in these problems; in other cases every effort should be made to inform the doctor of the working conditions of each man tested.

Goggles can be supplied which will fit over regular prescription glasses. In most cases, it is considered preferable to grind the prescription into the safety lenses. Such goggles must be carefully fitted to the worker so the optical centers of the lenses correspond to the pupils of the eyes. If lenses are round, they must be securely mounted so they cannot rotate in the frame.

Goggles or spectacles with glass lenses normally use glass which has been hardened—such impact-resistant glass goes by various trade names. The Federal Specification (GGG-G-G-501B) for this glass requires that it resist the impact of a steel ball weighing 0.561 oz. falling free for a distance of 50 in.

SHADES OF FILTER LENSES

National Bureau of Standards

SHADE NO.	APPLICATION
3	Protection from glare or reflected light, spotwelding, light brazing
4	Light acetylene cutting and burning
5	Light acetylene cutting and burning
6	General acetylene welding or welder's helper or setup on arc welding
8	Heavy acetylene welding or cutting or very light arc welding
10	Arc welding up to 250 amp.
12	Arc welding over 250 amp., atomic hydrogen welding
14	Carbon arc welding

Filter respirator mechanically removes particles from the air. This is a bag-type filter; others have disk or cylinder filters

If goggles are treated regularly with an anti-fogging compound they will cause less trouble in this respect.

Plastic lenses have become increasingly popular in recent years. They are light in weight and do not fog as badly as glass. Good quality plastic lenses have optical qualities equal to glass in light transmission and freedom from distortion. Light plastic has little resistance to penetration by pointed missiles but will withstand considerable impact from blunt objects; heavy plastic lenses (such as Plexiglas) may have higher impact resistance than hardened glass. Most plastics are soft and scratch easily. Care should be taken to protect plastic from scratches when the goggles are not being worn. Scratched lenses should be replaced.

One respect in which plastic is reported to be superior to glass is in resistance to pitting by sparks from grinding operations.

The principal types of protective devices and their applications are shown on the facing page. Some firms producing such devices have engineering departments to assist in analyzing requirements and drawing up protection specifications to cover each job.

Each worker should preferably have his own personal protective equipment. This should be carefully adjusted to fit him properly. Goggles have adjustments of the bridge and headband. Spectacles are adjusted at the bows and bridge.

Provision should be made for cleaning the equipment. Goggles and other eye equipment should be cleaned and sterilized before issue to a different worker.

Of equal importance with the selection and issue of suitable eye-protection devices is a program to insure that they will be worn. No exceptions to rules should be permitted. If workers must wear goggles, then foremen, inspectors, visitors and plant executives should all be required to wear the same devices in that area.

If goggles are properly fitted and kept clean and free from scratches, it should not be difficult to educate workers to wear them at all necessary times. Many plants have been able to get excellent results by education alone (for example, Ford Instrument Co., which was cited earlier in this report, got its results entirely by voluntary cooperation).

Other plants have found it necessary to take disciplinary action against employees who fail to wear their goggles. One effective method is to make it the responsibility of the foreman that all men in his department wear their goggles.

RESPIRATORY PROTECTION

The best and first solution to contaminated-air problems is to remove contaminants at the source by ventilation. When this is not possible, personal respiratory protection must be provided.

Each of the following types of equipment has definite uses and limitations. All equipment should bear approval of the U. S. Bureau of Mines.

GAS MASKS AND CARTRIDGE RESPIRATORS

Protection from solvent vapors and injurious gases is provided by

Air-line respirator is supplied with air from a compressed-air outlet

wearing a gas mask. Cartridge respirators provide similar protection but for shorter periods and against lower concentrations.

Canisters are painted according to a standard color code to indicate the protection they provide.

FILTER RESPIRATORS

A mechanical filter is effective against particulate matter. Specified types are approved for protection against non-toxic dusts, silica and other pneumoconiosis-producing dusts, and toxic dusts, fumes, and mists.

Mechanical filters provide no protection from solvent vapors, injurious gases, or oxygen deficiency.

HOSE MASKS

When air supply from beyond the contaminated area is required, hose lines (at least 1-in. dia.) with a mask and pump will provide protection. Hose should not exceed 150 ft. in length.

AIR-LINE RESPIRATORS

Protection similar to hose masks is provided by connection to compressed-air lines. Such respirators have a flow-limiting device. A trap and filter should be installed in the line to remove, oil, water, scale and other extraneous matter.

If air is supplied at more than 25 psi., an air-pressure regulator should be installed in the line with a pressure-release valve that will operate if the regulator fails.

For continuous work in atmospheres not immediately hazardous to life, the air-line respirator is the most desirable form of protection. In atmospheres immediately hazardous to life, hose lines are recommended because in event of failure of the air supply it is possible to breathe through a considerable length of hose.

SELF-CONTAINED APPARATUS

For atmospheres immediately hazardous to life more than 150 ft. from a source of fresh air, self-contained breathing apparatus is required.

Usually oxygen is carried in cylinders. A recent development that is much lighter has a small canister containing chemicals that liberate oxygen.

SUPPLEMENTARY PROTECTION

For abrasive blasting, mechanical protection for the head and neck must supplement respiratory protection. It may be supplied by a hood or helmet. A window of laminated safety glass should be protected by a 30- to 40-mesh fine-wire screen which covers the glass.

When atmospheres are corrosive to the skin, a complete suit of impervious clothing is required.

All respiratory devices should be stored in cool, dry places to prevent deterioration of rubber parts. All parts except filters and cartridges are cleaned after each use. Filters and cartridges must be replaced.

Respiratory devices should be cleaned when necessary and sterilized once a week. They should be sterilized whenever passed from one employee to another. Usually two devices should be supplied to each employee needing them so one can be worn while the other is being cleaned and repaired.

Careful training in the proper use of respiratory equipment is essential.

COLOR CODE FOR GAS MASK CANISTERS

COLOR	PROTECTION
Black	Organic vapors
White	Acid gases
Yellow	Organic vapors and acid gases
Green	Ammonia
Brown	Organic vapors, acid gases, and ammonia
Red	All industrial gases, including monoxide, smoke, and fumes
White, green stripes	Hydrocyanic acid gas
White, yellow stripes	Chlorine

FOOT PROTECTION

Feet are involved in about an eighth of industrial accidents. The proportion would be much higher without safety shoes. The number would be lower if all workers wore safety shoes.

Safety shoes are made in many styles, some of which are suitable for street wear. All of them include a reinforced toecap which is made of steel. An exception is shoes worn around electric equipment, in which case fiber or plastic toecaps are customary.

The cap must be capable of supporting a static load of 2500 lb. and an impact of 50 ft. lb. The inner surface of the cap must not come closer than ½ in. from the upper surface of the sole under either of these tests. Both men's and women's safety shoes should meet these requirements.

A model for use where there is hazard from molten metal or splashing acid or caustic solution has elastic side panels. It is tight-fitting at the top to prevent penetration of splashing fluids and can be pulled off quickly in an emergency.

Wooden soles are supplied for locations where leather or rubber would have a short life. They are suitable for hot operations or where there is dampness or oil. They resist the effect of acids and caustics

and protect against sharp objects such as nails, broken glass, and scrap metal.

Non-slip soles provide more secure footing on slippery floors. They may have cord or cork embedded in rubber. Synthetic rubber soles and heels resist oil and grease better than natural rubber. However, no sole can be guaranteed not to slip if excessive oil and grease are permitted to accumulate on the floors.

For work where there is an explosive hazard, non-sparking shoes are made. If a toecap is included it is plated or metallized. Any metal, other than the toecap and side-lasting staples, should be non-ferrous.

If static electricity can accumulate and cause dangerous sparks, conductive shoes are advisable. All metal except the toecap and side-lasting staples is non-ferrous. When these shoes are worn, floor oil, oily cleaning compounds, and insulating floor washes should be avoided. Workers can wear cotton, rayon, or nylon socks, but should avoid silk and wool. Soles and heels of these shoes must be kept clean to be effective.

For electrical hazards, safety shoes with a toecap should be capable of withstanding 10,000 volts ac. for 3 min. without leakage of more than 10 milliamperes. Reputable safety shoes are always plainly marked to indicate the type of protection they provide.

If more protection is desired than toecaps provide, foot guards are strapped over the shoes. They protect both toes and instep and will resist 300 ft. lb. without denting enough to damage the shoe or foot.

Plant activities should be analyzed and protective shoes selected to suit prevailing conditions for various jobs.

Safety shoes that are well fitted are as comfortable as other types of comparable weight. Proper fitting is essential. Large plants may maintain safety-shoe departments with trained personnel to fit shoes and give advice on minor foot troubles. Small plants frequently make arrangements with a local shoe store to handle the shoes and sell them to employees on a payroll deduction plan.

HEAD PROTECTION

Where there is danger of falling objects, the hard hat is an essential item of equipment. The hard case may be metal or (when there is electrical hazard) composition.

The Treasury Department specifications for hard hats specify one test as dropping an 8-lb. ball 5 ft. The hat must withstand this impact without breaking or denting enough to touch the cradle.

In another test, a 16-oz. carpenter's plumb bob is dropped 10 ft. to strike on the crown. The crown must not be dented or pierced more than 7/16 in.

The hard shell may have a complete brim or only a visor, depending on plant needs. It is supported by a hammock or cradle which keeps the shell away from the head and cushions the shock of impact. Both cradle and sweatband should be detachable so they can be cleaned or replaced.

The complete hat should weigh not more than 14½ oz.

HAIR PROTECTION

Long hair is a hazard around machinery. It may get caught in moving parts. Even though machinery is well guarded, all women workers should always wear hats. Many women prefer hairnets or turbans, but these are not considered sufficient protection.

A safe hat for women has a high crown and a visor (to warn when the head gets dangerously near machinery), a stiff crown which will reduce the chance of the cap getting caught in machinery, and is of generous size so it will pull off easily if it does get caught. The material should be flame-resistant if worn near sparks or flames. Caps should be durable enough to withstand commercial laundering.

Hats are available which meet these requirements, are light in weight, and are attractive. This last feature is an important consideration.

HAND AND ARM PROTECTION

Some form of hand protection is required in the majority of industrial jobs. Aside from the possibility of major injury, there are minor scratches, slivers, and skin irritations which risk infection and take a toll in discomfort and lowered efficiency.

A wide variety of protective equipment is available. These are the principal types:

Finger cots provide partial or complete protection for one or more fingers.

Hand pads provide protection primarily for the palm.

Mittens cover the whole hand with a separate division for the thumb. They are suitable only when precise finger movements are not required. Special types include one-finger mittens which have a separate division for the index finger; band mittens, which have a knitted wristlet, or a short or no cuff, for use when little or no wrist protection is required; and gauntlet mittens which have a cuff extending well up the forearm.

Gloves provide the most complete protection combined with freedom of finger movement. They are made in band and gauntlet styles.

Cuff guards are separate from gloves and provide protection for wrists and lower forearms.

Sleeves may protect the arm from wrist to elbow or from wrist to shoulder.

These devices are available in many materials. Selection of the material should be on the basis of the specific hazards of the job.

For sustained heat, asbestos or asbestos reinforced with leather are suitable. For protection from sparks, these materials or fire-resistant duck, leather, or fiber are satisfactory. When hot metal may splash, leather, fire-resistant duck, or fiber are suggested.

When there is dust, fabric, coated fabric, plastic, natural or synthetic rubber are suitable. For chips or abrasion it is fabric or leather. When there is danger of cutting, the leather may be reinforced with metal mesh. For electric protection or acids or alkalis, rubber is ideal.

Protection from oils, greases, or solvents is provided by synthetic rubber or plastic. These materials or coated fabric are suitable for moisture protection.

Leather for welding gloves should be chrome-tanned, soft, and

pliable split. It should be free from cuts, holes, or brand marks.

Gloves made of rubber, synthetic rubber, or plastic should be free of pinholes and embedded foreign matter.

SAFETY CLOTHING

Ordinary work clothes are safe for most operations. They should fit properly. Loose clothing might get caught in machinery. Oil-soaked clothing is a fire hazard and can cause skin irritation.

Safety clothing usually refers to special garments for protection against specific hazards. In addition to shoes, gloves, and hats, which are widely used, there are items for body protection ranging from aprons to complete asbestos suits.

Welders should wear clothing of chrome-tanned leather. Cotton shirts and dungarees are easily ignited, and the leather may prevent serious burns.

New chrome leather is vulnerable to molten-metal sparks. It will last much longer if broken in before severe exposure. When worn, the leather develops a glazed finish that resists sparks much more effectively.

Garments available for welders include overalls, pants, chaps, aprons, jackets, sleeves, gloves, mittens, and spats. The choice will depend on the conditions of work and the proximity of other welders.

Safety clothing may be made of the same materials used for gloves. The most common materials are asbestos, chrome-tanned leather, woolen cloth, fire-resistant cotton duck, and cloth which has been rubberized, plasticized, or varnished.

Shin guards of metal or hard fiber may be used in conjunction with safety shoes and foot guards.

Safety clothing itself must not constitute a hazard. It is well known that the necktie has no place in a metalworking plant, where it is a potential source of danger. In the same way aprons or loose coats worn for protection are hazardous near revolving or reciprocating machine parts and should not be worn in such cases.

Torn or ragged clothing, whether regular work clothes or special safety clothes, not only fails to give proper protection but becomes a hazard like the necktie or apron. In some cases protective clothing may be designed so that it can be removed instantly if it is caught by moving machinery.

For protection from liquids, upper garments should always hang over lower ones to provide adequate protection.

Snap fasteners are the generally preferred method of fastening safety clothing. Cuffs should be avoided, but there may be a fastening device to draw the ends of sleeves or legs tight.

When a worker is exposed to caustic or corrosive solutions, the clothing should be washed off with a hose before it is removed.

We Appreciate . . .

the invaluable assistance of the many firms and organizations listed below in the preparation of this report. They have available, in many cases, literature and engineering staffs to assist in the proper selection and application of safety equipment to industrial plants.

Acme Protection Equipment Co.
Advance Glove Mfg. Co.
All American Safety Equipment Co.
American Mat Corp.
American Optical Co.
American Standards Assn.
Award Incentives, Inc.
Benjamin Electric Mfg. Co.
Beryllium Corp.
A. N. Bradbrook
Bressler Co., Inc.
Buffalo Fire Appliance Corp.
E. D. Bullard Co.
Chemical Corp.
Chic-Maid Hat Mfg. Co.
C-O-Two Fire Equipment Co.
M. E. Cunningham Co.
Davis Emergency Equipment Co., Inc.
Dockson Corp.
Duracite Sales Co.
Electric Cord Co.
Elkhart Brass Mfg. Co.
Ellwood Safety Appliance Co.
R. W. Fieroh Co., Inc.
Firetox Systems, Inc.
Gro-Cord Rubber Co.
Hollywood Turban Products Co.
Wm. E. Hooper & Sons Co.
Industrial Gloves Co.
Industrial Safety Equipment Assn.
International Shoe Co.
Walter Kidde Co., Inc.
Kimball Safety Products Co.
Koffler Sales Corp.
Walter G. Legge Co., Inc.
Lehigh Safety Shoe Co.
W. I. Martin and Co.
Metropolitan Life Insurance Co.
Mine Safety Appliances Co.
Minnesota Mining & Mfg. Co.
National Safety Council
National Society for the Prevention of Blindness, Inc.
Nulite Displays Co.
Olympic Glove Co., Inc.
Pioneer Rubber Co.
Protectoseal Co.
Pulmosan Safety Equipment Corp.
Pyrene Manufacturing Co.
Robbins Co.
Robert's Associates
Safety First Shoe Co.
Scott Aviation Corp.
Seiberling Latex Products Co.
Spencer Turbine Co.
Titan Safety Shoe Co.
United States Safety Service Co.
Watchemoket Optical Co., Inc.
Wilkins Co.
Willson Products, Inc.

Fire Protection

FIRE LOSS is so obvious a waste that there should be no need to emphasize the need of adequate measures to prevent and combat industrial fires. The steps are to study the plant to discover the fire hazards, develop a plan to cope with them, and supply the correct equipment. Each plant will pose special problems and in establishing or reviewing such a program competent advice should be obtained from local fire authorities, insurance companies, and equipment manufacturers.

But this is not enough. Equipment must be in working order at all times, and this means that a system of inspection and maintenance must be conscientiously maintained. A fire extinguisher or an alarm that does not work is more dangerous than no protection at all. Some extinguishers must be discharged and recharged periodically, others need testing only. An extinguisher should never be hung up and then forgotten.

Every employee should be trained, and well trained, in the operation of hand extinguishers. Certain employees may receive more extensive training to form a plant fire brigade.

Although extinguishers are easy to use, and have simple instructions on them, it must be remembered that they are needed at a time of excitement and confusion, and suitable training in advance may mean the difference between a blaze quickly extinguished and a catastrophe.

FIRE PREVENTION

Each plant has special hazards and problems, but there are common causes such as faulty electrical equipment and careless housekeeping.

Most electrical fires start from defective insulation or switches, or from overloading. The worst form of bad housekeeping, and the most common, is the accumulation of combustible refuse.

One of the greatest industrial hazards is careless welding (remember the *Normandie*?). Sparks from welding may fly into hazardous locations and the welder, behind his shield, has no opportunity to spot these. Many insurance companies advise a helper for the welder, if for no other reason than to watch for sparks. It is a good idea to have a portable extinguisher at each welding unit.

Oil, paint, and other flammable liquids may cause spontaneous ignition when they get into rags, waste, or clothing.

All fire-fighting equipment should bear approval of either the Underwriter's Laboratories or Factory Mutual Laboratories.

TYPES OF FIRE

There are three accepted classes of fires.

Class A fires are those in ordinary materials such as wood, cloth, and trash which may be controlled by *Quenching* with water or solutions which contain a large percentage of water.

Class B fires are those in oil, grease, or other flammable liquids which need a *Blanketing* effect for control.

Class C fires are those in electrical equipment which require a *Non-conducting* agent for safe extinguishing.

In addition to these three major classes of fires, there is the possibility of metallic fires when working with a combustible metal and there are fires in transport equipment such as motor vehicles, airplanes, and boats. This last group is sometimes called *Class D* fires.

For metallic fires, a dry powder extinguisher such as G-1 powder, powdered soapstone; clean, dry, unrusted cast-iron chips; or graphite powder is suitable. A supply should be kept near each machine when working with magnesium.

FIRST-AID EXTINGUISHERS

Portable hand or wheeled fire extinguishers are classed as first-aid fire devices. The Underwriters Laboratories has established ratings for extinguishers on the basis of units of protection. One to five extinguishers make a unit. For example, an A2 rating means that the extinguisher is for Class A fires and two are required for one unit of protection.

The number of units required in a plant is determined by the insurance inspection department having jurisdiction over the plant. In general, Class I areas (such as offices) require at least one unit for each 5,000 sq. ft. of floor area and a person must not have to travel more than 100 ft. from any point to reach an extinguisher.

Class II areas (ordinary hazard

STANDARD FIRE EXTINGUISHERS

Underwriters Classifications

TYPE	SIZE	CLASSIFICATION
Soda-Acid	2½ gal.	A1
	1¼-1½ gal.	A2
Water or Anti-Freeze Solution, stored pressure cartridge	2½ gal.	A1
pump	5 gal.	A1
cask with 3 pails	50 gal.	A1
bucket tank with 6 pails	25, 35 and 40 gal.	A1
pump	2½ gal.	A1
pail	12 qt.	A5
Foam	2½, 5 gal.	A1, B1
	1¼-1½ gal.	A2, B2
Loaded Stream	1¾, 2½ gal.	A1, B1
	1 gal.	A2, B4
Vaporizing Liquid (carbon tetrachloride)	1, 2, 3 gal.	B2, C1
	1, 1¼, 1½, 2 qt.	B2, C2
Carbon Dioxide	15, 20 lb.	B1, C1
	7½, 10 lb.*	B2, C1
	4 lb.	B2, C2
	2 lb.	B4
Dry Compound	15, 25 lb.	B1, C1

*with 24-in. cone

areas of manufacturing or storage) require at least one unit for each 2500 sq. ft. of floor area and a person must not have to travel more than 50 ft. to reach an extinguisher.

In Class III areas (extra hazard areas such as paint spraying) the inspection department may establish additional units over those normally required for Class II areas.

PAILS

Fire pails are of 12-qt. capacity and may be made of galvanized iron or steel or of fiber. They should have covers. Casks or drums may be provided with pails nearby. If freezing temperatures are encountered, anti-freeze should be added to the water.

Pails are suitable only for Class A fires when it is possible to get close enough to pour or throw the water on the fire—about 10 ft. is the maximum distance water can be thrown from a pail. They are not suitable for use by women employees.

Pails should be hung on hangers or placed on shelves so they are 2 to 5 ft. from the floor. They should be conspicuously placed and well marked. Normally they are painted red. They should be kept full at all times and checked frequently. If the pail contains anti-freeze, it should be checked with a hydrometer. A suitable antifreeze is granulated or flake calcium chloride (free from magnesium chloride) and this should be kept available to add to the water as required.

SODA-ACID

The soda-acid is the most familiar type of hand fire extinguisher. It contains water in which bicarbonate of soda is dissolved and a bottle of sulphuric acid. When the extinguisher is inverted, the acid pours into the soda solution and carbon dioxide is formed. The resulting pressure forces the water out through the hose.

Because water is the extinguishing agent, the soda-acid type is suitable only for Class A fires. It should be used as close to the fire as possible, but will send an effective stream a distance of 30 to 40 ft. horizontally.

Once begun, there is no control over the discharge. The 2½-gal. extinguisher lasts about a minute and the smaller size about half as long.

Soda-acid extinguishers must be recharged once a year. This is a good time to instruct personnel in their use since the old charge can be used before refilling. They should be inspected several times a year, in addition to the annual recharge.

When refilling (which should be done immediately after use) the extinguisher should be cleaned and all parts inspected. The soda should be thoroughly dissolved in lukewarm water. Anti-freeze cannot be used in soda-acid extinguishers.

WATER EXTINGUISHERS

Hand extinguishers filled with water or anti-freeze solution may be operated by a pump or by a cartridge of carbon dioxide. It is only necessary to recharge them after use, but they should be inspected frequently.

They are effective against Class A fires and will throw a stream 30 to 40 ft. However, they should be used as close to the fire as possible. The 2½-gal. extinguisher is effective for 1 min. and the 5-gal. extinguisher for 2 min. The pump-operated extinguisher can be used intermittently.

FOAM

Foam extinguishers have bicarbonate of soda and a foam stabilizing agent dissolved in water with an inner cylinder containing aluminum sulphate. When the two are mixed by inverting the extinguisher, foam and carbon dioxide are formed.

Unlike other extinguishers, the foam type is best used at a distance and will work up to 30 or 40 ft. It is effective on small Class A and B fires. It is especially good for fires in flammable liquids because it

TYPES OF FIRE EXTINGUISHERS

TYPES	SODA-ACID	PUMP TYPE	PUMP TYPE	FOAM	VAPORIZING LIQUID	CARBON DIOXIDE	DRY POWDER
Chemical	Soda solution and sulphuric acid	Water	Anti-freeze	Aluminum sulphate and soda with foam agent	Carbon tetrachloride base	Carbon dioxide	Bicarbonate of soda and other powders
Operating method	Invert	Invert or pump	Invert or pump	Invert	Pump or open valve	Open valve	Open valve
Extinguishing effect	Cooling & quenching	Cooling & quenching	Cooling & quenching	Blanketing	Blanketing	Blanketing	Blanketing and Sweeping
Protection from freezing required	Yes	Yes	No	Yes	No	No	No
For Class A fires (ordinary combustion)	Yes	Yes	Yes	Yes	No—but some value on small fires	No—but some effect on small fires	No
For Class B fires (oil, grease, paint)	No	No	No	Yes	Yes	Yes	Yes
For Class C fires (live electrical equipment)	No	No	No	No	Yes	Yes	Yes

Soda-acid fire extinguisher. This is also typical of the appearance of some water and foam extinguishers

Vaporizing-liquid fire extinguisher. This model is the pump type; others may contain a pressure cylinder

Water extinguisher of the pump type is filled with 5 gal. of plain water or antifreeze solution

Carbon-dioxide extinguishers have a horn from which the gas is directed on the fire

forms a floating blanket on the surface of the liquid.

Once started, there is no control over the discharge, which lasts for about 40 sec. (1¼- or 1½-gal. size) or 1 min. (2½- or 5-gal. size). The extinguisher must be protected from freezing. Antifreeze cannot be added to the solution.

LOADED-STREAM

Loaded-stream extinguishers contain a solution of an alkali metal salt which freezes at —40 F. They are operated by a cartridge of carbon dioxide. They are effective for use on small Class A and B fires.

Inspection should be made at frequent intervals, but the extinguishers need recharging only after use. There is no control over the discharge, once begun, which lasts 40 to 60 sec., depending on size.

VAPORIZING LIQUID

The vaporizing-liquid extinguishers contain a special liquid made with a carbon tetrachloride base.

It freezes at —50 F. These extinguishers are suitable for Class B and C fires and are ideal for vehicles and boats because they do not have to be kept in an upright position.

Some extinguishers have a compression chamber which can be recharged by filling with carbon dioxide or compressed air, others have a compression cylinder filled by a built-in hand pump, others are operated by a hand pump. The last type can be used intermittently, the others are continuous.

Inspection should be at frequent intervals and once a year it is advisable to discharge part of the liquid, then refill.

When employed in confined areas, care must be taken not to breathe the vapors.

CARBON DIOXIDE

Carbon-dioxide extinguishers contain carbon-dioxide gas under pressure which is delivered through a cone. They have a range of about 8 ft. They are effective on Class B and C fires and are suitable for vehicles or boats.

They can be discharged intermittently and last 15 to 60 sec. They can be operated while being carried about but in confined areas care must be taken not to breathe the vapors produced.

Inspections should be frequent and at least once a year they should be weighed to check the amount of charge they contain. If 10% of the charge has leaked out, they should be recharged.

DRY COMPOUND

Dry compound extinguishers contain treated sodium bicarbonate in dry powder form which is expelled by carbon dioxide from a cartridge. They are suitable for Class B and C fires.

First-aid equipment will control most fires if properly supplied, maintained, and employed. For those that hand extinguishers will not control, other types are necessary.

In large plants, employee fire brigades are desirable because they can reach the scene faster than city firemen. They should have special training in use of fire hose, wheeled extinguishers, and other types of firefighting apparatus, ladder practice, salvage procedures, and other phases of fire fighting.

Fire hose for outside use is 2½-in. single-jacketed rubber-lined hose. Double-jacketed hose for rough service or rubber-covered hose in areas exposed to fumes may be needed. For inside use, 1½-in. unlined linen hose will last indefinitely if kept dry. After use it should be dried thoroughly.

Fire partitions with fire doors are desirable to confine fires. They should either close automatically every time they are opened or by some heat-actuated device. If there

Wheeled extinguishers are made in types similar to hand extinguishers, but much larger. This is a 40-gal. foam extinguisher

are exterior hazards, windows should have fire shutters of swinging or roll design.

An alarm system, either automatic or manual, should be installed. Automatic systems have spot- or line-type thermostats. They may operate either at a fixed temperature or on a sudden rise in temperature. Electronic devices will detect smoke.

AUTOMATIC SPRINKLERS

Automatic sprinkler systems have proven effective in 96% of fires in sprinklered property. The sprinkler head has a fusible plug which melts and releases the water. Various types of heads are available to suit different temperature conditions.

A sprinkler system should include a supervisory control system to detect:

1. Open or closed position of control valves.
2. Flow of water in sprinkler systems, indicating fire or leakage.
3. Water levels and temperatures in gravity and pressure tanks.
5. Fire pump steam pressure.
6. Voltage of supply for electric fire pumps.

The dry pipe system is used where there is danger of freezing. Instead of water, the pipes are filled with air under pressure. If a sprinkler head opens, the air pressure is released. This drop in the line pressure opens a valve which admits water to the system.

With the dry pipe system there is a short delay between the opening of the sprinkler head and the beginning of water discharge onto the fire. Therefore, it is better to use a wet pipe system whenever possible.

Special sprinkler systems which spray carbon dioxide, foam, or water spray may be required in some locations.

An independent sprinkler unit which can be hung near the ceiling is automatic in operation and sprays vaporizing liquid. It is effective in small inclosed areas against Class B and C fires.

Fabrics can be flameproofed. Material can be purchased already treated or compounds can be applied to old or new fabric. Welding curtains, garments for hazardous work, and protective covers should be flameproofed in this way.

Playpipes are nozzle extensions for fire hose which make it possible to get the stream closer to the fire. A recent development is a foam-making playpipe which will spray either water or foam. Foam is produced by mixing solution and air with the water. This type of playpipe will produce about 350 gpm. of foam from 20 gpm. of water and 1 gpm. of solution. It is intended for use against special hazards.

TRAINING

It is good practice to train all employees in the rudiments of handling hand extinguishers, and to see that everyone knows the location of fire alarm boxes.

In addition, many plants now have a fire brigade made up of men who receive special training in fire fighting in addition to their regular duties. Such men will normally have specific assignments to carry out in case there is a fire in the department. Experience has shown that in the majority of plants with a trained fire brigade, most daytime fires are extinguished prior to the arrival of the city firemen.

The potential savings of such a brigade are thus great enough to justify the time lost in production by these men to receive the required training. This training should give each member of the brigade a knowledge of the types of fires and the methods of fighting them, the use of equipment, and should include periodic drills with practice fires.

Large plants may require regular company fire department. Help in training and equipping either type can usually be obtained from the local fire department.

Foam-making playpipe mixes a special foam compound with air and water in the playpipe

ROUND TABLE

"Good Morning to You"

"I don't know whether that idea of yours of greeting everybody in the morning pays or not," said Ed. "Seems like a waste of time to pass the time of day."

"Sure it pays," said Al. "There's nothing better than starting the day off right; what's better than letting the fellows see that you have their interest at heart?"

"You'll more than likely be bawling somebody out within the hour; you can't be greeting them with a smile all day long, you know, Al."

"Sure I know that, Ed," smiled Al. "And let me tell you: if any of the boys deserve to be bawled out I'm the one who will do it."

"Well, I question the whole idea—what do you gain by it anyhow? I'll bet some of the guys are figuring that you'll be making a touch pretty soon!"

"I'll tell you what I'll gain, Ed—the satisfaction that I am doing my part in starting the boys out with a feeling that they are human beings and not just machines. Besides, I've got my eyes open as I make the rounds and can spot something that I would not be aware of if I didn't make the tour."

"What are you going to do one of these mornings when you come to work with a hangover yourself?" Ed pressed, "Do you think you can swallow your grouch and put on the glad smile? The men'll know you're putting on a false front."

"That's one of the reasons why I put this into effect, if you want to know the truth," Al confided. "Sometimes, I'm down for the count, spiritually, like this morning. I said to myself as I entered the shop, 'Al, you can't carry on with this on your chest; get it off. So go around and wish all the fellows a good morning and put on the old smile!' "

"Very nice of you, I must say!"

"Ed, I had the choice of brooding over my troubles all day long with a sour face, or using a little horse sense and putting my troubles behind me."

"Do you mean to say, Al, that you can right-about-face, just like that?" Ed doubted, raising his hand and snapping his fingers. "You try to tell me that you can shake off a grouch so easily?"

"Try it yourself if you don't believe me, Ed. I didn't think it could be done, but I'm convinced now that it can. In giving out to the men, I can relieve myself of my own troubles."

"Horsefeathers!"

"Horsefeathers, your grandmother," insisted Al. "It works. What's more, we all get started on a pleasant basis, regardless of what happens later on."

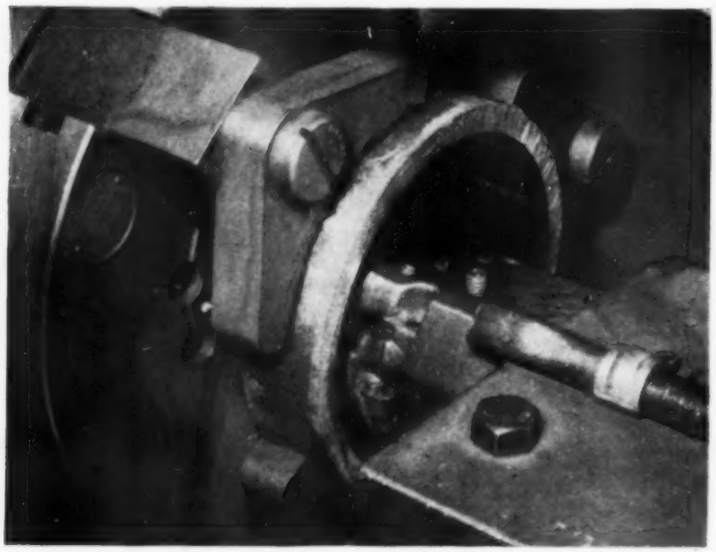
***IS THE "GOOD MORNING" ROUTINE** archaic, or a basic psychological force in labor relations in the shop? How important are "breakfast-table grouches" in disrupting the working day? Your opinions will interest others. Discussions of previous topics on later pages.*

1 **Forged-steel rings** are arc-welded at the joint before machining to form Dynaflow brake bands

HOW BUICK MAKES DYNAFLOW BRAKES TOUGH

Brake bands in the Dynaflow transmission are far from ordinary. To hold 150 hp. without chatter, they are machined from forged rings

BY CHESTER S. RICKER, DETROIT EDITOR



2 **Inside diameter** is first bored to proper size. Such high operational stresses are imposed on the bands that welding lugs to ordinary rolled-steel strip was impractical

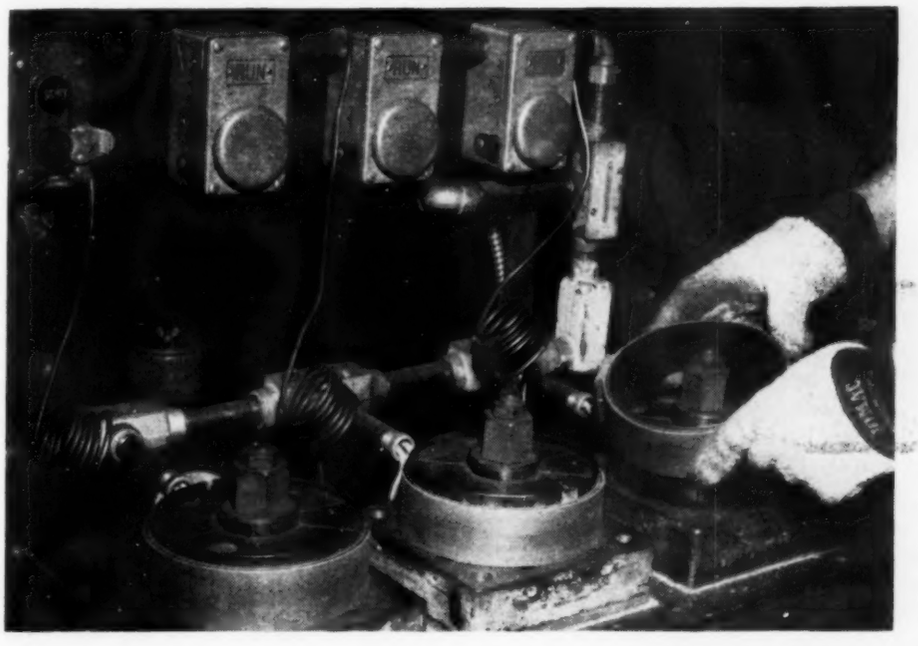
BRAKE BANDS for the planetary gear sets in Buick's Dynaflow transmission are not ordinary brakes in design, material or function. The two bands—for low-speed and reverse drums—operate in a bath of lubricating oil. They need high pressure to operate under such conditions and must be capable of taking the full torque from the Buick 150-hp. engine without slipping or chatter.

Rings are forged from flat stock and arc welded at the joint to make a complete

3 **Contour milling** brings band to proper thickness but leaves metal for anchor and actuating lugs. Milling is performed on Sundstrand machines with the cutter spindle set vertically. The band then looks like the view at right. The lugs are broached to shape before the lining is cemented into the band.

4 **Cycleweld cement** is sprayed on the inside of the brake band, as it is rapidly rotated

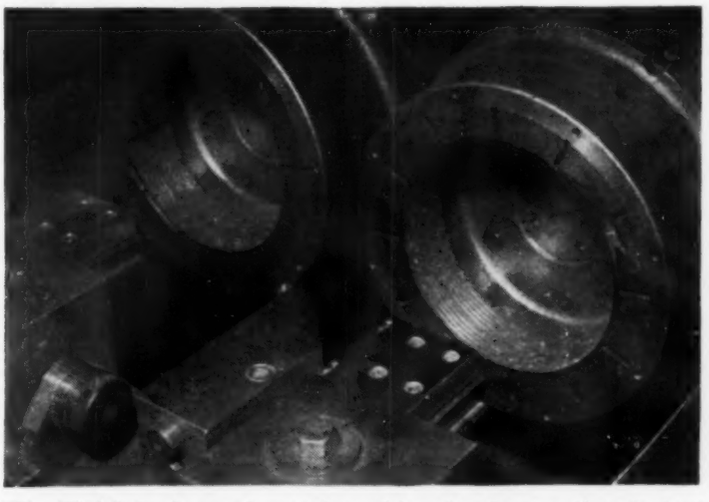
5 **Thermoid metalized lining** precut to correct length is inserted in the brake band



6 **Triple-station electric vulcanizer** heats the band and lining to 450 F. for 5 min. to polymerize the cement. Each unit consists of a multiple split mandrel which expands inside the drum. An air cylinder pulls a central taper plug down to expand the mandrel and hold a pressure of about 200 psi. against the lining as the cement softens under the heat

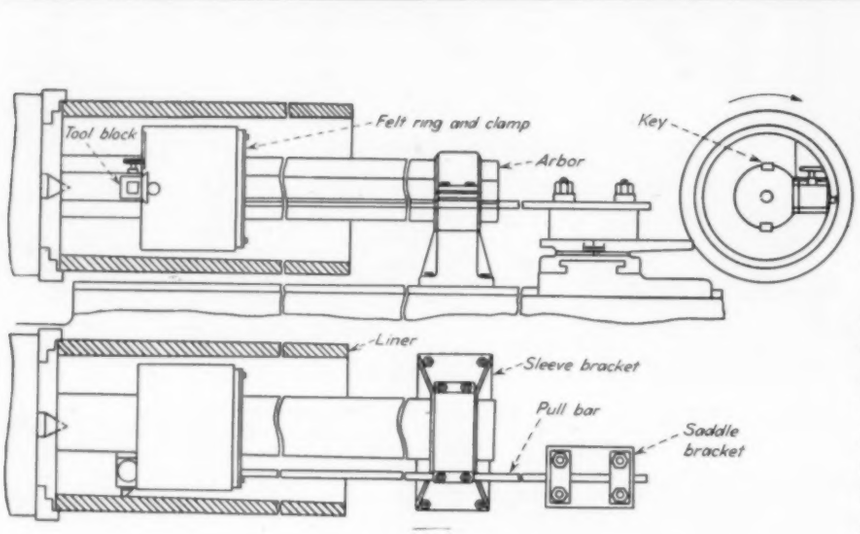
ring. All machining operations are performed on this solid ring so close tolerances can be held. The band is machined, and sand-blasted on the inside. Then a 1/16-in. brake lining is cemented to the inside by Cycleweld. Only after finish boring, grooving, and contour milling of the anchor points, is the brake band slit with a ¼-in. milling cutter.

Steps in producing these unusual brake bands are illustrated on these pages.



7 **Finish boring** and grooving of two bands at a time is done on this Ex-Cell-O machine. Carbide tools at left of each head perform first operation, form cutter completes machining

Practical Ideas



Tapered Flat on Boring-Bar Arbor Guides Boring Tool in Liner

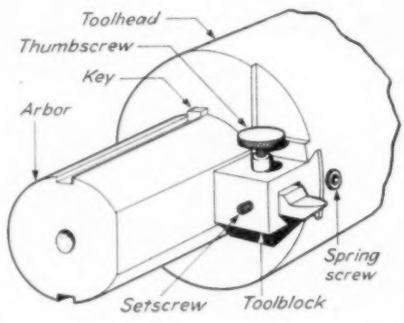
Large-scale tapering was done with an unusual boring-bar setup to cut a 0.0015-in. taper inside a cast-iron liner. The liner was 6 ft., 2 in. long and had a 22-in. diameter at the throat.

Instead of offsetting the tailstock on the usual manner, the work was set straight with the lathe axis and a tapered flat on the boring arbor guided the tool. The arbor was turned on the lathe and then slotted for two keyways. The flat was machined with 0.00075-in. taper along the arbor midway between the keyways.

The setup was made with the work chucked in the lathe at one end, and the other end was held in a three-point steadyrest (not shown in the illustration). The arbor was set inside the work, with one end centered on the spindle nose and the other held in a sleeve bracket that was bolted to the machine bed. This prevented any side movement and insured accuracy.

The tool was mounted on the back of a sleeve-type toolhead which was machined to slip fit over the arbor. Since cutting motion was from head to tailstock (left to right), this meant that chips fell out after the toolhead had passed and the vital danger of seizure was minimized.

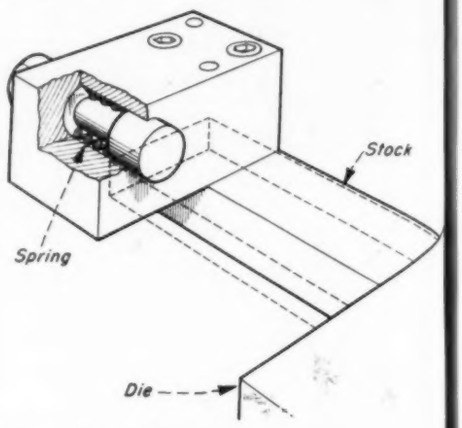
Seizure due to dust was warded off by a felt ring, clamped to the tailstock end of the toolhead by a steel ring and screws. The felt fitted closely around the arbor and pushed dust ahead of the toolhead.



The tool was a short cutting tool, held in position by a setscrew and a thumbscrew. For roughing cuts the setscrew alone was used to clamp the tool, while for finish cuts the adjustment was made close by the end of the thumbscrew, which was pointed. This point was set in a vertical hole through the tool, and was screwed down to advance the tool (see detail).

The small toolblock, which was dovetailed into the side of the toolhead, was forced against the flat on the arbor by a spring acting on a pin in the dovetail side of the block. The spring was held in place by the spring screw.

Feeding the tool was accomplished through a pull bar that was screwed into the forward end of the toolhead and connected to a bracket on the lathe saddle. Engaging the lathe feed gave the operation a wide range of feeds for roughing and finishing cuts. *C. D. Mackinnon, Airdrie, Lanarkshire, Scotland.*



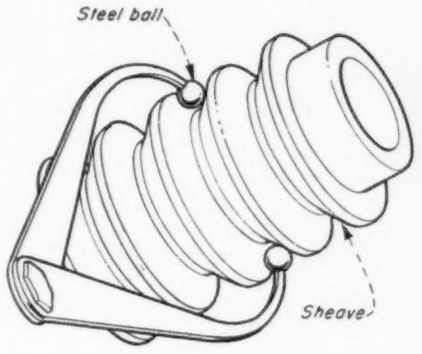
Die Spring Deflects Under Heavy Shearing Side Load

Heavy sheet stock is commonly sheared off in a press shear with a blade that has a beveled edge—with the bevel nearest the section of stock being cut off. Ordinarily this beveled edge forces the stock against the stop, and that's hard on both the stop and the shearing punch.

We overcame this trouble by adapting our stop with a high-pressure, medium-deflection spring. A drilled and reamed block was set up on the stop arm with the spring resting inside. A hardened drill-rod was ground down on its shank to slip fit in the hole and bear against the spring.

The small end of the pin was

threaded before hardening to take two lock nuts that confined the travel toward the punch. In operation the stock is pushed to the pin, which stops it against ordinary pressure, and the shear is tripped. When the shear forces the stock against the stop with more than normal force the spring deflects and saves wear on the punch. *Roger Isetts, Kenosha, Wis.*



Caliper Made into Sheave Gage

For many years I have been machining multiple-groove V-belt sheaves and have employed the illustrated calipers for checking dimensions.

The calipers were made from heavy outside calipers with steel balls welded to the tips of the legs. They are handy tools for checking all diameters of sheaves, and are especially suitable for duplicating existing sheaves.

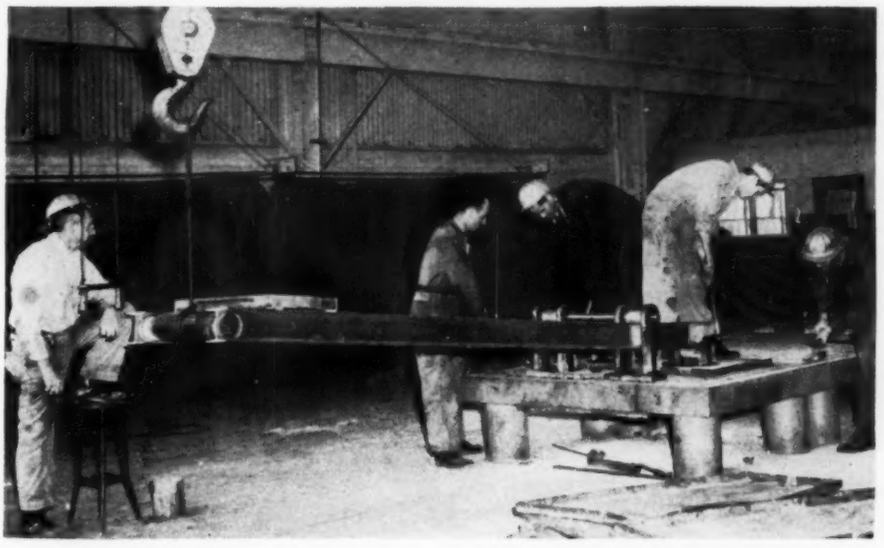
Outside diameters of sheaves can be checked easily, and the depth of cut, if the work is being done on a lathe, can be also duplicated. Assuming that the angle cut on the sides of the sheave is correct, the balls can be placed in opposite sides of the V, and scale or micrometer measurements can be made across the caliper. Pitch checks are equally simple. *Carl A. Yard, Sea Girt, N. J.*

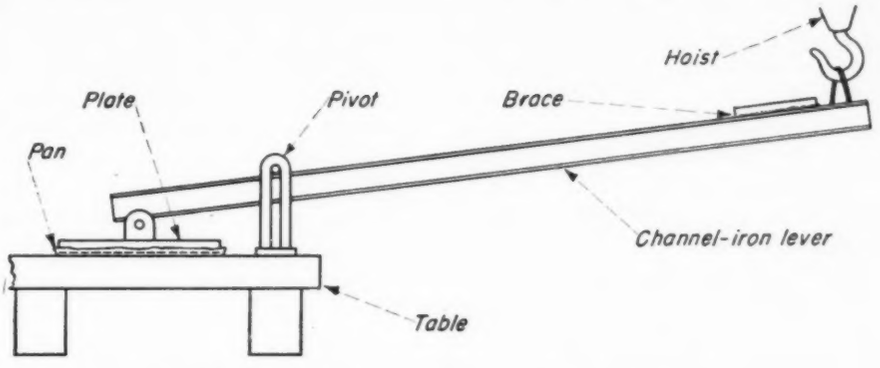
Steel Wool Removes Small Burrs

A precision boring and facing operation on aluminum die castings left a fine burr on the edge of the work which had to be removed.

This could not be done in the machine, and hand filing or scraping took too much time. Deburring with a wire brush was out of the question because it scratched the finished surface, which had to be dead smooth because it acted as a seal.

The problem was solved by holding a pad of fine steel wool in one hand and placing the work on it and giving the work a couple of quick twists. This method will also remove fine burrs from steel or cast-iron parts. It will not do for heavy burrs, but takes off fine, threadlike burrs. *George Ryder, York Corp., York, Pa.*





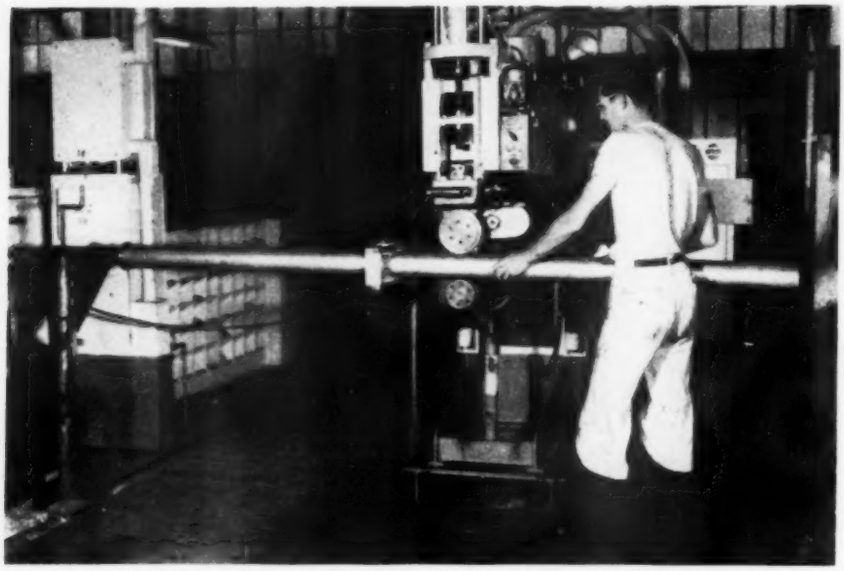
Makeshift 80-Ton Clamping Press Flattens Explosion-Damaged Pans

Shutdown time was held to a minimum while explosion-damaged steel pans in a crude-oil heater were repaired in an improvised press. The press was constructed of two I-beams, which acted as lever arms, a steel plate for flattening the pans, and a pivot. The press force was provided by a crane.

Bearing points were welded in place and the 12-ft. by 8-in. beams were mounted under a heavy bar close to one end. The other end was held up by the hoist and exerted a force of 80 tons through the mechanical advantage of the lever.

The 18-in. by 30-in. pans were pressed under the large plate while boilermakers hammered the 1-in. edges of the pan against the edges of the plate. The complete operation reclaimed 275 plates with a cost of about $3000, and saved the $12,000 cost of new plates.

Setup time for the press was about 4 hours, and the saving in shutdown time, which affected the complete refinery, was seven days. *Union Oil Company, Los Angeles, Cal.*

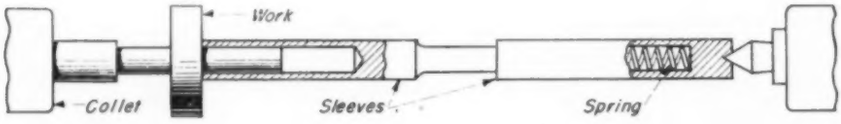


Seamwelding Extension Mandrel Simplifies Tube Joining

Tubular seamwelding operations require that a copper mandrel be inserted in the tube to convey the current and also to support the work. On a long tube this mandrel would be too unwieldy to handle, so a spring-loaded arm is extended into the tube to carry a mandrel.

Roller pressure clamps the mandrel to the tube and 18 in. is welded in one stroke. The rollers are released, the spring returns the mandrel to its original position, and the rollers are again clamped. The process is repeated until the complete piece has been welded.

This idea has saved the company from purchasing expensive special equipment, and has also released a helper. The reduction in fatigue and manhours required has increased production 400%. *Thomas Kent, North American Aviation, Inc., Los Angeles, Cal.*



Sleeve Holds Heated Rollers Snug Against Tapered Mandrel

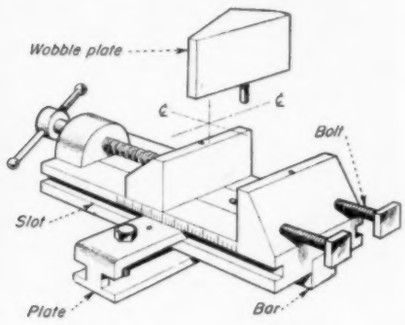
A production order of small rollers with holes through their centers ran into trouble when we were grinding the outside diameters with a lathe-mounted grinding attachment. The rollers were mounted on a mandrel centered in the lathe.

However, after grinding had started on each piece, the roller heated up and slipped on the tapered mandrel. This trouble was corrected after we devised a work positioner that held the rollers tight against the mandrel, regardless of the temperature or inside diameter.

The regular tapered mandrel was fitted with a sleeve that was bored to the same taper to fit over one end. The tailstock end of the sleeve was fitted with another sleeve that carried a compression spring backing up a centerdrilled rod. This fitted over the tailstock center.

When the work heated up, it was forced by the spring in the direction of the headstock, and therefore higher along the tapered mandrel. The system worked perfectly to hold the work steady for grinding.

Only one precaution was necessary—the work had to be tapped off the mandrel immediately after the grinding was finished to prevent it from freezing to the mandrel while cooling. *W. S. Ball, Guelph, Ontario.*



Vise Changes Expand Utility

Several changes were made to a small machine-table vise in our shop that made it more accurate and more usable for clamping work.

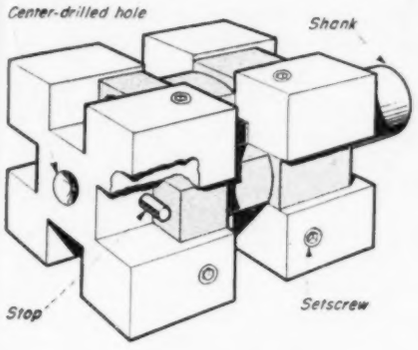
Horizontal slots were milled in the two sides of the base to allow clamping the ends of two plates down on it. The plates were bent and welded to a single flat piece that could ride on a table T-slot. Square-headed bolts provided adjustment.

A long bar was added to the base, under its center, to slip into a T-slot running at right angles to the plates. This feature does not include a clamp, but it aligns the jaw perpendicular to the slot.

Lines were scribed on the top of the two jaws to line up with the center of the bar below the base. A zero mark was made on both side-clamping plates and scales were scribed along the edges of the jaws perpendicular to the slot.

In addition, a wobble plate was added to center in a hole in the base, inside the jaws.

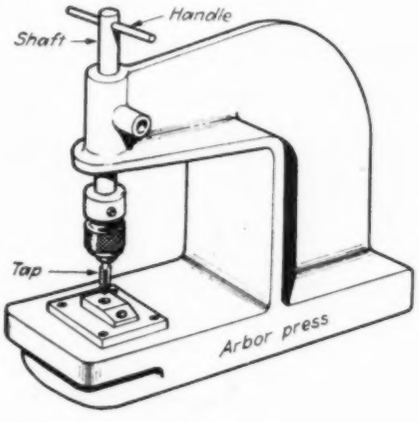
With these additions, many odd-shaped pieces can be clamped. Work can be centered exactly in the jaws, and the vise can be clamped to practically any machine table. The clamps are also removable, so the vise can be set up on a magnetic table as well. *Chandler Phillips, Millbrae, Cal.*



Fixture Clamps Clutch Bolts For Grinding Radius

The fixture illustrated saved considerable time in the grinding of curved surfaces on small parts. The diameter on these clutch bolts was about 1.7 in., so the fixture was designed to hold four parts at the correct radius.

Both ends of the fixture were center-drilled, and a slice around the block was milled out to expose the areas on the part to be ground. Stop pins driven into holes in the channels locate the parts endwise, and two setscrews per part clamp them in position. *Joseph V. Tyler, Chicago, Ill.*



Arbor Press Precision Taps

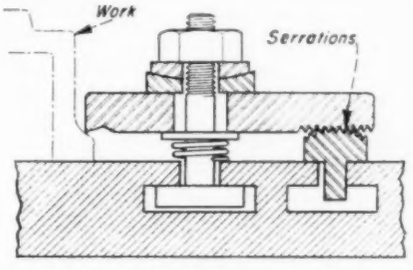
Precision tapping in small lots of small parts can be handled on an ordinary arbor press without any permanent change in the tool.

The arbor and leverage mechanism must be removed to clear the hole for an accurately turned or ground spindle. This may be bushed if the bore in the press is too large. The spindle is cross-drilled at the top to take a handle. Hand-applied leverage drives the tap.

At the bottom of the spindle, a drillpress chuck is mounted. This can be done with a large collar that is drilled for setscrews (to hold the collar to the spindle) and for a drift. The bottom part of the bore must be tapered to fit the chuck shank.

The tap is mounted in the chuck and tapping is done by hand. Work can best be mounted on a flat-ground plate bolted over the hole in the bed of the press. The plate may have to be drilled through for clearance.

Work tapped in this manner can be held to close tolerances in regard to the perpendicularity of the axis of the tapped hole. For reconversion to arbor-press work, the plate, spindle and chuck can be removed and the original parts replaced without any trouble. *Joe Manius, New York, N. Y.*



Serrated Strap and Pad Hold On Short or Slanted Flanges

Small flanges that ordinary straps cannot hold firmly can be clamped down by a strap whose heel is cut with straight serrations that parallel the part edge being gripped.

Both the strap and pad can be serrated in a shaper, with the pad serrations cut on a radius that allows firm gripping whether the clamping point on the work is above or below the level of the pad. The gripping edge on the strap is cut back at a slight angle.

The serrations are cut with a 1/16-in. pitch, although any convenient pitch could be used. The gripping power of the serrations prevent the strap from moving out while it is being forced into position. *F. W. Duce, Dudley, Worcestershire, England.*

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PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES — A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

REQUIREMENTS — Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

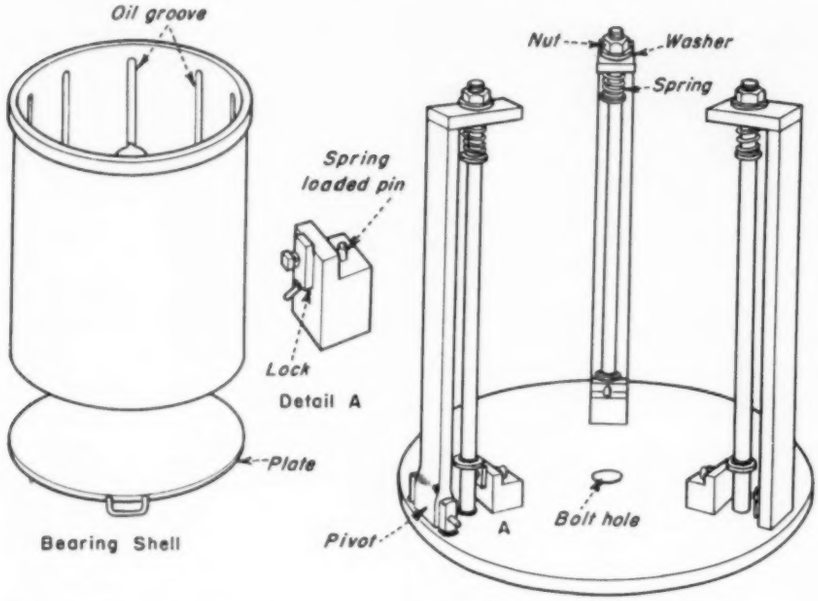
WHO MAY ENTER — Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER — Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

61ST WINNER:

W. Lewis

Turret-Lathe Attachment



Clamping Fixture Holds Bearing Shell for Oil-Groove Machining

A large connecting-rod bearing shell produced in our shop was too heavy to be handled easily and located by one man, although he could lift it to the machine table without much trouble. To make the positioning for an oil-groove-slotting operation easy, and to hold the work steady during machining, this fixture was developed.

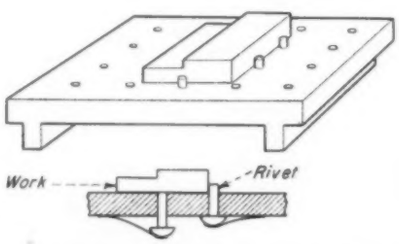
The fixture is set on a vertical slotter, bolted in position through a hole in its center. Two of the long clamps are adjustable. Their lower ends are confined by straps that loop around pins driven into the base plate. At the top, a washer and nut fit each clamp. Springs, backed by washers welded to the rods under the clamps, force the clamps up and off the bearing shell when the nuts are run back.

The third clamp is pivoted at its lower end on a pin, which allows it to be removed completely when new work is being placed. The rod is threaded and drives into a tapped hole in the base.

When a new shell is being set up, the third clamp assembly is removed, the flat plate is placed on the three lifting pins, and the locking lever is turned vertical to fit in the loop on the plate. This lock, with the two plate guides on the other two clamping rods, hold the plate down and in position. The work is then lifted to the plate, the lock turned horizontal and the plate slipped out.

The pins inside the bearing blocks are spring-loaded so they will not drop down to let the shell rest on the bearing blocks until the clamp pressure is applied. This releases the shell when the clamps are loosened.

The oil grooves, which are shown in the left-hand illustration, are machined with a slotting bar. Transverse grooves are milled. *Ralph R. Waech, Tacoma Wash.*

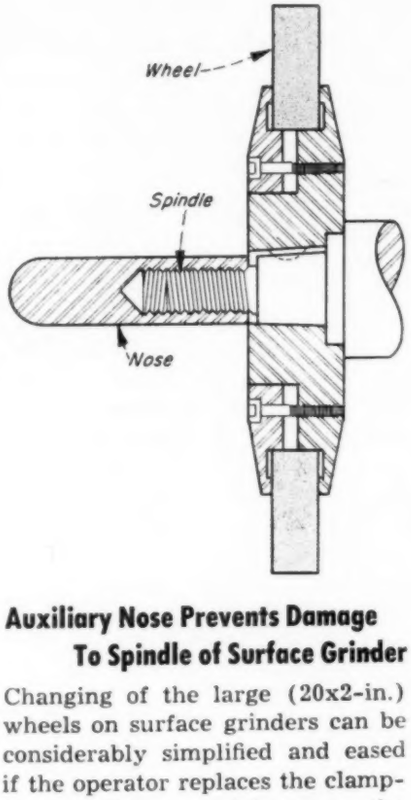


Spring Stops Locate Short Jobs

Frequently the installation of small end stops can speed up short runs of shearing, sawing and punching operations. Our shop uses these stops for such work, and also for drilling work.

The stops can be short sections of rod, or can even be large rivets. The mounting plate should be about twice the thickness of the stops for firm support. The backing springs are flat spring steel, riveted, bolted, or welded in place. All holes are drilled the same size.

A large plate drilled in many places can be set up on the machine table and stops can be inserted in appropriate holes. *W. W. Quist, Seattle, Wash.*



Auxiliary Nose Prevents Damage To Spindle of Surface Grinder

Changing of the large (20x2-in.) wheels on surface grinders can be considerably simplified and eased if the operator replaces the clamping nut with a special nose on the spindle before removing the wheel.

When removing the wheel, the nose prevents damage to the threaded spindle, and when installing a new wheel, it makes locating much easier, especially when the wheel is so heavy that it is difficult to control when mounting. The nose does not interfere with the keyed mounting system that supports the wheel.

The nose I use is about 6 in. long with a smooth end turned on a lathe. Its outside diameter is the same as that of the outside edge of the tapered section of the spindle on which the wheel rides. *Harold W. Cutting, Lompoc, Cal.*

NEWS OF METALWORKING

Additional Military Plane Orders, U. S. Warnings Spur Aircraft Plants

WASHINGTON—The aircraft industry, spurred by stern warnings from the military that production schedules must be kept and aided by an additional $103-million order from the Air Force, is gradually swinging into a semblance of some of its wartime activity.

USAF had already allocated $1,345,000,000 for aircraft procurement during fiscal 1949. The Navy has allocated $653,635,000 for the same period.

These new orders went to:

Lockheed Aircraft Corp., Burbank, Calif., for additional F-80C jet fighters, bringing the company's backlog on this type to nearly 800 planes.

Republic Aviation Corp., Farmingdale, N. Y., additional 100 F-84E jet fighters, making a total of 1,100 F-84's on order of which 300 have been delivered.

Boeing Airplane Co., Seattle and Wichita, 13 more four-engine B-50C long-range bombers. Using the new Pratt & Whitney variable discharge turbine engine, the B-50C will be so different from its predecessors in the B-50 line that the USAF will designate B-50C production models as the B-54, an entirely new type. Boeing is now scheduled to build 33 B-54's.

An additional $44 million was also made available to the USAF to spend on pre-production tooling for new models and tooling for higher volume production on planes already being built in small quantities.

The $103 million came from the $199 million in USAF procurement funds withheld last June by presidential order. Because of the deterioration of the international situation, Defense Secretary James Forrestal loosed the $103 million and is studying allocation of the remaining $96 million in the USAF till.

USAF still has $344 million frozen in the defense secretary's office for new tooling to step up production rates. Government will retain title to all tools and equipment purchased under this program.

The Navy, which still has about $100 million of its fiscal 1949 aircraft funds frozen by presidential order, is expected to ask for approval to pour this fund into additional contracts during this month.

New orders from funds previously released to the USAF and Navy went to:

Goodyear Aircraft Corp., Akron, Ohio, for design and development of the largest blimp in Navy history. Intended for anti-submarine operations, the new blimp will be 324 ft. long with 825,000 cubic ft. of helium and will carry an 84-ft. double-decked cabin for a crew of 14.

A/C Sparkplug of General Motors Corp., which got the largest peacetime order for aircraft sparkplugs from the USAF, will provide 285,000 aircraft sparkplugs for Pratt & Whitney Major engines, at a cost of $1 million.

SKF Industries, Inc., Philadelphia, which announced substantial increases in new orders for jet engine bearings.

Meanwhile, Air Force Secretary W. Stuart Symington was giving the aircraft industry sharp private warnings to step up production schedules. Symington's warnings were caused by an increasing lag in military aircraft deliveries. He is worried partly because he feels the international situation now demands a substantially-modernized air force in being and partly because the second $6-billion step in the USAF five-year expansion plan will be hard to sell the 81st Congress if manufacturers do not make good on their current commitments.

Significant reflections of Symington's note of urgency are:

USAF plans to put the radically-designed sweptwing, six-jet Boeing B-47 bomber into production a full year earlier than originally planned. About $40 million of the $96 million now under study by Forrestal is earmarked to begin B-47 production early next year at Boeing's Wichita plant. Production line is already being set up there and preliminary tooling engineering is well advanced. The B-47 is the fastest USAF jet bomber now in the air. Two experimental models are flying.

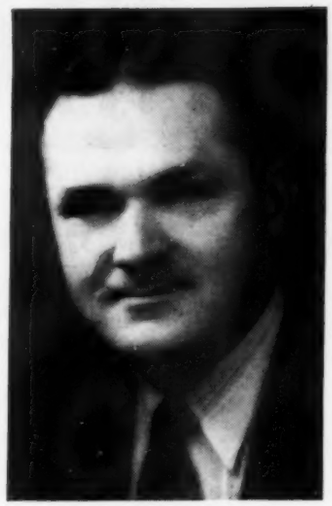
Convair's Fort Worth plant accelerating to a six-day week and 10-hour shift to prevent deliveries from lagging on the Convair giant six-engine B-36 10,000-mile bomber.

Also significant is the USAF decision to spend additional money for types already in high-volume production and proved through tactical service with USAF units rather than more technically-advanced models that have yet to finish their operational proving period.

***NEW JENSEN HELICOPTER** hovers over the hills near Tonasket, Wash., where it was designed and built by former Bendix personnel*

Robert L. Giebel

O. W. Johaning



E. B. MacDonald

Cooperation Urged By R. L. Giebel, President-Elect of Distributors

DETROIT—Machine tool distributors have three functions to perform: (1) to serve their customers adequately, (2) to serve machine tool builders, and (3) to aid each other, said Robert L. Giebel, newly-elected president American Machine Tool Distributors Association, at the twenty-fourth annual meeting of the association at the Hotel Statler Sept. 16-17. Mr. Giebel is president of Giebel, Inc., New York City.

O. W. Johaning, president Colcord-Wright Machinery & Supply Co., St. Louis, was elected first vice president of the association and E. B. MacDonald, vice president Syracuse Supply Co., Syracuse, N. Y., second vice president. C. C. Brogan, W. E. Shipley Machinery Co., Philadelphia, was reelected secretary-treasurer.

Elected to the board for three-year terms were: Alex B. Todd, Jr., of Harron, Richard & McCone Co., Los Angeles; John M. Riordan, Riordan Machinery Co., Detroit, and Charles S. Bradeen, Upton, Bradeen & James, Ltd., Toronto.

Mr. Giebel said that the national defense program just ahead presents production problems far more complicated than those which machine tool distributors helped to solve during World War II. He declared that distributors must develop business by pointing out ways and means of cutting costs and improving quality.

Distributors should not hesitate to ask the factory to send out an engineer to make key calls on customers with the salesman, said James Y. Scott, president Van Norman Co., in a panel discussion of sales problems. The engineering skill that the factory possesses should be put to work in the field. The builder and the distributor must have a thorough understanding and common regard one for the other.

Mr. Scott stressed the fact that, by the nature of the machine tool business, the distributors' organization has necessarily become a sales engineering type of activity. He expressed the opinion that it is becoming harder and harder for the easy-going salesman to get orders for today's machines. He urged distributors to do more than just sell machine tools; they must go to top management and convince them that an up-to-date plant pays. He commented on the tremendous desire on the part of people in England and Europe to find out how American productivity is achieved.

Other members of the panel, who mostly repeated their talks given at the recent Ithaca sales course, were George Habicht, Jr., president Marshall & Huschart Machinery Co.; R. A. Vidinghoff, vice president Swind Machinery Co.; and Thomas R. Rudel, president Rudel Machinery Co., Inc.

A. G. Bryant, president National Machine Tool Builders' Association and vice president Cleereman Machine Tool Co., outlined the machine tool situation today. He discussed the renegotiation problem and the outlook for ECA purchases of machine tools telling about his recent European trip.

Metalworking operations promise to stay close to current levels up through the first six months of 1949, said Burnham Finney, editor American Machinist, in presenting "The Outlook for Capital Goods." Expenditures for new plant and equipment, for one thing, will continue close to a record rate in the next nine months.

Mr. MacDonald made a detailed report on the statistics of doing business furnished by members of the association, while E. P. Essley, E. L. Essley Machinery Co., described the report of the overhead expense research committee, which will be sent to members soon.

Congressman Howard A. Coffin of Michigan was chief guest and speaker at the annual dinner. D. N. Macconel, president Machinery Sales Co., Los Angeles, Calif., who is retiring as association president, presided at all the sessions. A visit to the Rouge works of the Ford Motor Co. was one of the convention highlights.

The 1949 spring meeting of the association will be held at the General Oglethorpe Hotel, Savannah, Ga., April 11-12, and the 1949 fall meeting at the Edgewater Gulf Hotel, Edgewater Gulf, Miss., Oct. 27-28.

Europe Wants U. S. Tools, Berna Says

NEW YORK—Machine tool buyers in Marshall Plan countries should be given freedom of choice in the machine tools they want to purchase, said Tell Berna, general manager National Machine Tool Builders' Association, upon his return from Britain and the Continent. If they have that choice and are willing to pay for U. S. machines in their own currency, their governments should ask for inclusion of funds for purchase of U.S. machines in their ECA requests.

Mr. Berna pointed to the large backlog of orders in the hands of European agents of U.S. machine tool builders as proof users want American machines. Those users are prepared to put up their own money for them, but their governments will not allot the necessary dollars. The natural recourse then is to ECA, which was created for that exact purpose.

***BRITISH AND AMERICAN** machine tool leaders at the Machine Tool and Engineering Exhibition at Olympia, London; W. J. Morgan, secretary of the British Machine Tool Trades Association; Tell Berna, general manager, and A. G. Bryant, president, of the National Machine Tool Builders' Association, and J. Holland Goddard, president of the British association*

Lag in Productivity One of Top Business Problems, AMA is Told

NEW YORK—The lag of productivity behind the increase in the cost of labor is one of the top problems facing industrial management today, executives were told at sessions of the Personnel Conference of the American Management Association, September 23-24 at the Hotel Pennsylvania.

Stressing the significance of this condition, Clifford F. Hood, president, American Steel and Wire Company, pointed out that "production is (only) part of the answer to the inflationary trends that are in existence today. Unit cost is the other part. The one final criterion as to whether production is efficient and effective is the unit cost of labor in the finished product."

Along similar lines, Frank Rising, general manager, Automotive & Aviation Parts Manufacturers, in support of his view that productivity is not related to wages, stated that the gains we have made in man-hour efficiency "can be traced to inventive genius in improving machines, not to the eagerness of the worker to do a good job."

Participating with Mr. Rising in this panel on "Relation of Wages to Productivity" were John S. Bugas, Ford Motor Company; Mark Starr, International Ladies Garment Workers Union, and Leo Wolman, National Bureau of Economic Research. Mr. Starr declared "that productivity is now rising at a rapid pace" and called for the development of a rational approach to the solution of the problem of distributing the gains of this increase.

Continuing on the productivity theme, Meyer Kestnbaum, president, Hart, Schaffner & Marx, stated that "our great hope lies in the constructive approach—in the application of intelligence and research to the techniques of management." This speaker noted that we must develop a healthy industrial climate, in which workers believe that industry is interested in providing an increasingly higher standard of living and in which our competitive profit system is willing to accept an increasing degree of social responsibility.

On the first night of the conference, L. R. Boulware, General Electric vice-president in charge of employee relations, introduced the first public presentation of a review of the developments during the past year in the company's new and broader employee, community and union relations program. This presentation covered diagnosing company problems and formulating programs, a nine-point job-improvement program and other direct relations with employees, employee attitudes in relation to community thought, dealing with employees through unions, an appeal to each member of management stressing the importance of the program and two sound movies. The program was prepared for the instruction of GE's management, and other professional and "contact" employees.

Other topics of major interest to management, as revealed by the AMA program, which is planned to cover those subjects that a survey shows are of high interest to the membership, include the relationship between line departments and personnel, long-range labor-management relations, legal aspects of labor relations, the impact of selective service upon company planning, and pension plans as a subject of collective bargaining.

Exhibited for the first time in the New York area was a sample display from AMA's original 1948 "Personnel Workshop", consisting of literature, forms, and manuals in every field of personnel activity. An AMA official pointed out the emphasis being placed on training of the management team, and the interest being shown by company executives in the labor press. Alert managers like to know the kind of information given employees through union papers.

IAM To Stay Free

WASHINGTON—There is little chance of an early reaffiliation with the AFL by the International Association of Machinists.

The IAM is spending for other purposes the $300,000 it had saved in escrow for back per capita tax payments which would be due the AFL on rejoining.

Hunter Spring Opens New Unit

LANSDALE, PA. — The Hunter Spring Co. formally opened its new plant at No. 1 Spring Avenue Sept. 22. President Knowlton D. Montgomery disclosed that the opening marked a final consolidation of all spring operations into one unit.

A group of 20 civic officials, leading engineers, and executives of industries in Montgomery County, Pa., were guests at a luncheon, plant tour and official ceremonies marking the occasion. The new brick and steel plant covers 35,000 sq. ft.

An outstanding feature of the layout is the Central Inspection Department. Here, with specially designed precise measuring and testing equipment, modern methods of statistical quality control are applied to the activities of all departments. Major functions of central inspection include, (1) acceptance testing of incoming materials, (2) control of the manufacturing process, and (3) checking each shipped lot and reporting results to buyers.

Detroit

AUTO MARKET VIEWED WITH UNCERTAINTY...YEARLY MODEL CHANGES LIKELY...MACHINERY BUYING LOW

The interesting side of the Detroit outlook right now is the increasing regularity with which concern is expressed over the size of the automobile market ahead. None of this concern comes from the automobile companies themselves — they continue highly optimistic. It emanates from the curbstone analysts and from observers who pride themselves on a little more detachment than is shown by the company people.

Here are the statistical factors at play in the situation:

1. Vehicle production since the end of the war has amounted to nearly 13-million units—enough to sop up all the demand based on stark need, and much of the "desire" kind of demand.

2. Prices have risen close to double prewar levels, eliminating untold numbers of marginal buyers.

3. Reinstatement of credit curbs in recent weeks has intensified the purchase difficulties of the lower income buyers.

4. Used car prices—the true barometer of demand intensity—are sagging, the way they did a year ago; in the upward turn last spring they did not rebound to previous peaks.

5. Where auto companies were estimating industry backlogs of 15-million or so cars at the end of the war, the estimates have now tapered to some 7-million at the outside.

Demand Uncertain

Add this all together, and it implies a far-from-certain base of car demand. It indicates that any turn of consequence in public psychology might upset present orders: after all, comparatively few people are to be found today who can afford a car and who cannot get along much longer with the one they now have.

In a word, the automobile market has moved from a period of certainty, built on statistical facts, to uncertainty.

Some analysis is that the coming winter will see a further softening of demand, resulting in much more ready availability of higher-priced cars. Next spring and summer will take up this slack, but it may prove the last phase of the seller's market. By fall, this thinking goes, most all cars will be available in somewhere near normal time-spans.

Increased Tooling Result

That 1949 may be the turning point could be read into some of the developments of recent weeks. General Motors, for example, began to produce its new Kettering engine at Olds and Cadillac—the first significant postwar engine change in the corporation, aimed at better operating economy and, of course, sales appeal. Word leaked out that Chrysler Corp. will definitely have new models next year, probably in the first quarter—the first time this producer has changed its models since the war. All companies are going to greater lengths than in almost a decade to train salesmen and field personnel to do a better job.

What does this mean to the machine tool man? It means that there is growing up a pressure for model changes and improvements which has not existed since 1938—that companies may be forced by competition to undertake the kind of year-to-year tooling in the not distant future that has been unnecessary for a decade.

Notwithstanding this, machinery buying currently continues low, particularly in the special category. One machinery company is understood to be seeking to maintain its volume by going after die work. Out-of-town companies are coming into Detroit aggressively seeking business, reportedly undercutting prices in order to be sure of booking orders. Detroit firms, faced with higher wage schedules, are concentrating more than ever before on improving their productivity; otherwise they will be hard pressed to compete.

The General Motors shifts in mid-September, spread through the top corporation command and several of the divisions, are being interpreted as clearing the decks for aggressive marketing, and moving new and younger men into vital positions.

G.M. Personnel Changes

Harlow H. Curtice, general manager of Buick, was named an executive vice-president, the fourth in the G.M. hierarchy. Curtice will be in charge of staff work, definitely an administrative post. L. C. Goad, formerly general manager of Fisher, becomes the executive in charge of assembly and body plant operations. William F. Hufstader, Buick sales manager, takes charge of distribution (sales) for the corporation. J. J. Cronin is made general manager of Fisher; Ivan L. Wiles takes the same job at Buick.

***HEAVY-DUTY** engine lathe used for turning crankshafts up to 84 in. in diameter and 50 ft. in length was built by Mackintosh-Hemphill Co., Pittsburgh. The company has manufactured larger lathes, one during the war which was 114 ft. long, 12 ft. in height and weighed 300,000 lbs.*

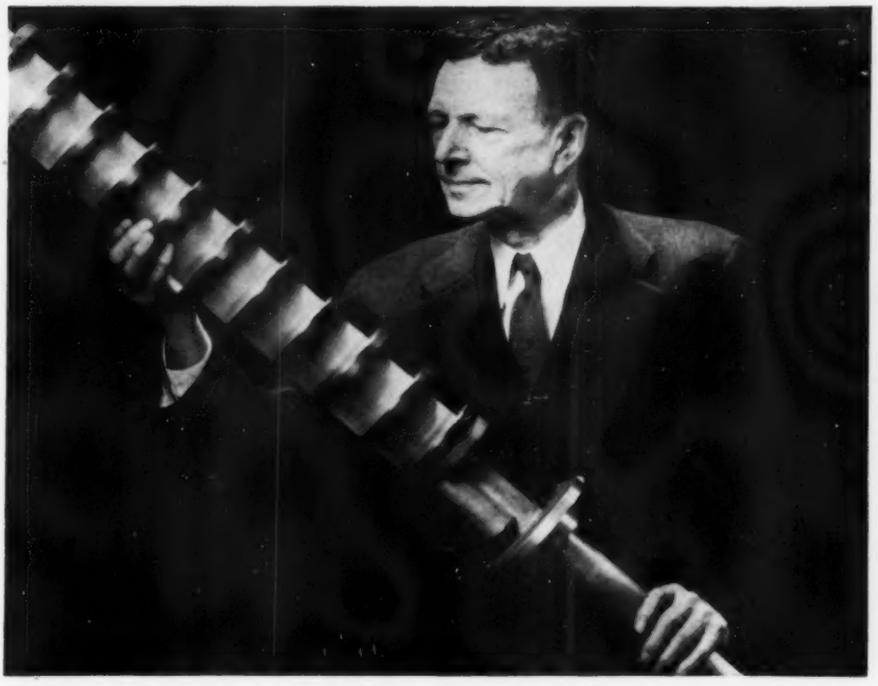
Largest X-Ray Lab Dedicated at Milwaukee

MILWAUKEE—The world's largest x-ray development laboratory was dedicated here by the General Electric X-Ray Corp. Sept. 13 as a permanent living tribute to Dr. William D. Coolidge, 75-year-old x-ray pioneer and Director Emeritus of General Electric's research laboratory in Schenectady. Known throughout the scientific world as "father of the modern x-ray tube", Dr. Coolidge was a member of the original commission which recommended launching of the Atomic Energy Program. Holder of 83 patents, he originated the "cascade" principle which made possible the million-volt x-ray tubes in common use today.

Ceremonies for the dedication of the Coolidge Laboratory were witnessed by more than 500 visitors and all employees at the corporation's new 400,000-sq. ft. Milwaukee plant. Among those present to pay honor to Dr. Coolidge were Charles E. Wilson, president of General Electric Company; John H. Clough, president of General Electric X-Ray Corporation; Dr. Arthur C. Christie, internationally known radiologist; Dr. Lauriston Taylor, director of the X-Ray Laboratory at the National Bureau of Standards; G. S. Crane, president of Cutler-Hammer, Inc.; and many other industrial leaders, physicists, research scientists, and x-ray specialists.

The laboratory, valued at close to $750,000, has undergone a 100% expansion in comparison with the establishment maintained for applied research by the corporation while it was located in Chicago. It will be used for the study of x-ray inspection of industrial products, and for the development of specialized x-ray apparatus for the medical profession. The laboratory houses a high-voltage section where tests now are being conducted on a two million volt x-ray machine which can penetrate 12-in. of steel in 8-hr., an operation requiring eight days when using radium.

Delivering the principal address of the dedication, Dr. Coolidge reviewed developments in x-ray apparatus since Roentgen's discovery of X-Rays nearly 53 years ago, and discussed their uses in both the industrial and the medical fields. He cited the need for a "much more sensitive receiving system than the simple fluoroscopic screen or intensifying screen and film," and reported that "much effort is being devoted to a study of various electronic methods of intensifying screen luminosity."



***ONE-MILLION-VOLT** x-ray tube is held by Dr. William D. Coolidge, who was honored at Milwaukee*

Charles E. Wilson, speaking at the dinner which climaxed the dedication ceremonies, stressed the need for industry, "as a duty to itself and the society in which it lives," to encourage and maintain both fundamental and applied research programs, even though corporations may not be able to justify them on profit and loss statements. In addition, he stated that "today it is increasingly necessary for those of us who are identified with industrial research programs to explain what we are doing in our laboratories, and how this work affects the security and happiness of our fellow citizens, quite apart from the immediate effect upon the products and services we offer for sale. In the same manner, industry today devotes a considerable amount of its time and money in telling the public about its behavior and motives, where it used to be content to let its products speak for themselves. This is because business today is more than just manufacturing and selling; it has social and economic obligations to all the people which go beyond that primary reason for its existence."

Screw Machine Prizes Awarded

ROCHESTER, N. Y.—Two Midwestern youths have been awarded $1,500 scholarships for three years of study of screw-machine engineering at the Rochester Institute of Technology, the Institute and the National Screw Machine Products Association have announced.

The RIT program in screw-machine engineering was set up two years ago through the material cooperation of the NSMPA. Winners of the scholarships, established by the Titan Metal Mfg. Co., Bellefonte, Pa., and the D.A., Stuart Oil Co., Chicago, are Bruce Watkins, Osceola, Ind., and John M. Carney, Elyria, Ohio. Both are 18 and recent high school graduates.

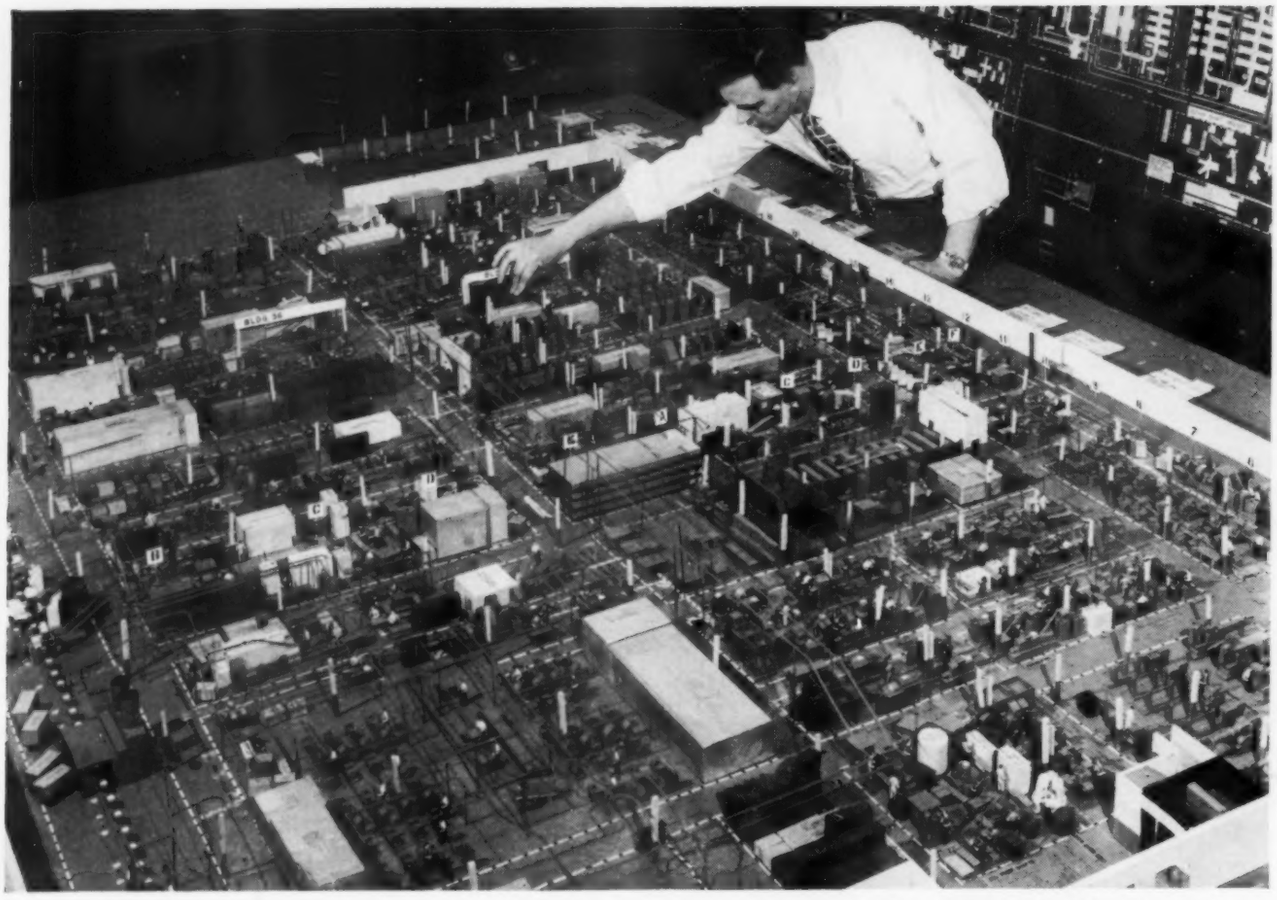
100th Anniversary

SCHENECTADY, N. Y.—American Locomotive Co. plant observed its 100th anniversary here the weekend of Sept. 24.

The company, dominant in the manufacture of steam locomotives for a century, has converted 100% to the manufacture of diesel-electric locomotives.

Pensions, Health Benefits To Workers on Increase

WASHINGTON — The number of workers getting pensions and health benefits under union contracts is growing rapidly. There are now more than 3 million workers covered, not including those who get such benefits outside a union contract. Most are in clothing and textiles, coal mining and transit industries.



THREE-DIMENSIONAL MODEL LAYOUT *was used to plan and construct the new engine plant of the Oldsmobile Division, General Motors Corp., Lansing, Mich. Exact specifications were worked out in detail by the Methods Engineering Department. The model contains 3,200 individual pieces all made to the scale of one-fourth in. to the foot. The plant is now producing the new Oldsmobile V-8 engine for 1949 models*

Trend Toward Automatic Control Evident at Instrument Exhibit

PHILADELPHIA—The trend toward greater productivity and closer accuracy through mechanization and automatic control was evident in the equipment on display at the Third National Instrument Conference and Exhibit at Convention Hall Sept. 13-17. More than 175 manufacturers exhibited products estimated to exceed $10,000,000 in value.

The swing toward wider application of controlling apparatus in manufacture was explained in terms of tangible savings resulting from such installations. Any operation that can be controlled manually can be handled through proper instrumentation. Direct labor savings frequently amortize the initial cost in a matter of months, it was pointed out.

Operating economies also may come from greater efficiency in utilization of productive equipment. Heat treating operations that must be performed within a given-range can be run closer to the top limit, because with modern quick-response instruments there is little danger of over heating. Thus, faster production is possible.

At the same time, improved quality may be obtained, engineers said. Temperatures and time periods at various levels of heat can be arranged in accordance with a predetermined program that is known to produce better metal grain structure.

Plating solutions lend themselves to similar controls. Both operations can be adjusted automatically to compensate for variations in load in continuously operated tanks and ovens.

Accompanying the greater use of instruments in processing is a change in attitude on the part of instrument companies toward servicing their product. Years ago, instruments were sealed, and users were discouraged against maintaining them. Today, many plants have set up their own repair departments and numerous instrument manufacturers are designing their product with component assemblies, so whole units can easily be removed. Quick replacement with a spare assembly minimizes production losses.

The conference and exhibit, sponsored The Instrument Society of America, meeting jointly with the Industrial Instruments & Regulators Division of the American Society of Mechanical Engineers, American Institute of Physics, and Joint Subcommittee on Electronic Instruments of the American Institute of Electrical Engineers, was supplemented by technical sessions dealing with current topics in the field.

Also on display were a variety of old instruments, some of which dated back to the turn of the century. From these exhibits the evolution of the modern instrument could be traced.

Typical of the advances made in the science of measurement were instruments capable of splitting the second into a million parts. One possibility with such devices is to photograph bodies rotating at high velocity at the moment of breaking. This enables study of the failure for guiding information in design. Other physical phenomena can also be measured.

Interest ran high both among buyers and those attending the technical sessions.

Names in the News

James K. Fulks

John F. Miller

James K. Fulks, vice president in charge of manufacturing, Ex-Cello-O Corp., Detroit, has been named a director of the company as well as an active officer, and **John F. Miller** has been appointed sales manager of the Machine Tool and Cutting Tool Divisions. **D. H. McIver** was named sales manager of the Aircraft and Miscellaneous Parts Divisions.

J. F. Ginna has been appointed assistant to the vice president in charge of production of the American Car & Foundry Co.

J. C. Kuhn has been named general sales manager of the Morse Twist Drill & Machine Co., New Bedford, Mass., succeeding **Mort Rainey** who has resigned as vice president and sales manager.

S. J. Matchett has been named manager of the Detroit office of Pratt & Whitney, Division of Niles-Bement-Pond Co. He succeeds the late **H. William Kopf** as head of machine tool sales in Michigan.

Paul S. Strecker

S. J. Matchett

Paul S. Strecker has been appointed works manager of the Toledo Machine & Tool Division of the E. W. Bliss Co. He was formerly assistant to the president, Marshall M. Smith.

Burleigh Owens, formerly headquartered in Cincinnati, has taken over the management of the Chicago branch of E. C. Atkins & Co., saw and saw tool manufacturers.

Carl F. Schultz has been appointed engineering assistant to **T. W. Skinner,** general manager of the Lincoln-Mercury Division, Ford Motor Co.

Ray H. Sullivan has been appointed assistant general manager of Rouge automotive operations under **Logan C. Miller,** Ford Motor Co.

H. R. Butts has been appointed general sales manager, Wire Division, Electric Auto-Lite Co., Toledo.

Gustave R. Geiger has been named supervisor of quality control of SKF Industries, Inc., and will be responsible for establishment of procedures and the maintenance of product standards in the manufacture of anti-friction bearings.

John E. Brennan, Jr., of Lowell, Mass., has been appointed manager of the new time and job standards department of the Stamford Division, Yale & Towne Mfg. Co.

Frank T. Lewis has been appointed manager of manufacturing in General Electric's Aeronautic and Ordnance Systems Divisions. He was formerly assistant manager of the Schenectady Works.

George W. Schwager has been named sales manager of the Billings & Spencer Co., Hartford, Conn., succeeding **W. Dorsey Endres,** resigned.

Paul R. Curtis, Jr., has been appointed general sales manager of Plume & Atwood Mfg. Co., Waterbury, Conn., and **Ernest C. Britton,** sales engineer.

Marvin Leeper has been appointed plant engineer at the Gary, Ind., plant, American Bridge Co.

Gilbert B. Richards has been appointed general sales manager of Firth Sterling Steel & Carbide Corp. with headquarters at McKeesport, Pa., to coordinate the sales of the steel, carbide and tool-making divisions of the company.

G. B. Richards

Lewis W. Metzger, vice president, has been made executive assistant **to Marvin W. Smith,** executive vice president, Baldwin Locomotive Works, Philadelphia. **James R. Weaver** has been named manager of manufacturing, and **John S. Newton,** manager of engineering at the Eddystone Division. Mr. Weaver and Mr. Newton came to Baldwin from Westinghouse Electric.

Gene P. Hopkins has been appointed general works manager of Nelson Stud Welding Division, Morton-Gregory Corp., Lorain, Ohio.

Dr. Lewis Warrington Chubb, director emeritus of the Westinghouse Research Laboratories, has retired after 43 years of scientific research.

P. J. Jensen, formerly executive engineer in the Engineering and Research Department, Carboloy Co., Inc., Detroit, has been appointed manager of the Michigan district, with headquarters in Detroit, succeeding **M. E. Knoll** who is retiring after 19 years with the company.

Dr. Ward Harrison, international authority on lighting, and director of engineering for General Electric's Lamp Dept., Nela Park, Cleveland, resigned his position Aug. 31 at the age of 60, under the provisions of the company's pension plan. He will be succeeded by **Willard C. Brown,** who during his 28 years with the company has headed its activities in many fields.

William F. B. Henderson has been appointed executive vice president and a member of the board of directors of the E. W. Bliss Co., Detroit. Mr. Henderson was formerly executive vice president and director of Clearing Machine Corp., Chicago.

William F. B. Henderson

Business Items

Geometric Tool Co., New Haven, Conn., has named **Mideke Supply Co.,** Oklahoma City, as distributor for Oklahoma.

Lindberg Steel Treating Co. will open a new custom heat-treating plant in St. Louis, Mo., about Nov. 1.

Hydraulic Press Mfg. Co. has moved its New York office to 500 Fifth Avenue, New York 18, N. Y.

Jas. P. Marsh Corp., Skokie, Ill., has acquired the **Witt Gauge Division, National Pressure Cooker Co.,** Eau Claire, Wis.

Inland Steel Products Co. has opened a new branch office and warehouse at St. Louis, Mo. John E. Meroney has been appointed district sales manager in charge of the division.

Die-Mold Corp. has moved into its new plant at 6619 Motor Avenue, Milwaukee 13, Wis.

A. O. Smith Corp., Milwaukee, has purchased the **Burkey Co.,** Toledo, Ohio.

Gisholt Machine Co. has opened a new branch office at 315 McClatchy Building, 69th and Market Streets, Upper Darby (Philadelphia), Pa. Ervin A. Huza has been added to the new office.

Tinius Olsen Testing Machine Co. has moved into a new plant adjacent to Philadelphia on Easton Road, Willow Grove, Pa.

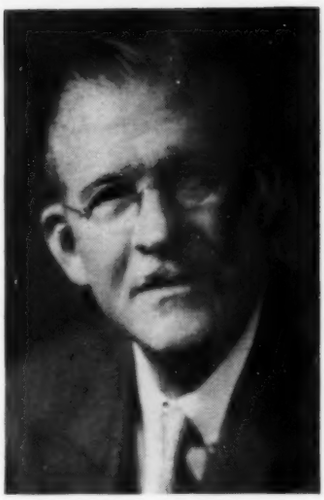
The Guide Co., designers and manufacturers of machinery for the steel industry, has moved its offices and factory at Canfield, Ohio, and a plant at Beaver Falls to Leetonia, Ohio.

Blade Mfg. Co., Columbus, Ohio, has a $60,000-expansion program underway which will expand their production facilities 50% on circular saw blades.

Frontier Industries, Inc., Buffalo, N. Y., has purchased the **Fairmount Tool & Forging Co.,** Cleveland, Ohio.

Fansteel Metallurgical Corp., North Chicago, has acquired the common stock equity in **Vascoloy-Ramet Corp.,** Elkhart, Ind.

Central Brass Works, Toledo, has merged with the **Toledo Castings Corp.** and will continue to operate under the latter's name. J. O. Helm is president of Toledo Castings.



A. C. Higgins

Obituaries

Aldus C. Higgins, 75, for nearly a half century closely identified with Norton Co., Worcester, Mass., died Sept. 10 at his home in Worcester. At the time of his death, Mr. Higgins was chairman of the executive committee of the company. He came with the company as patent counsel in July, 1900, and later served as president, general manager and chairman of the board.

Carl A. Carlson, sales engineer for Norton Co., died Aug. 29, in a plane crash near Winona, Minn. He came with the company in 1913 and in 1920 aided in the organization of the company's branch plant in France. He was the inventor of a billet and a wire grinding machine.

Emil R. Gasser, director of research of Farrel-Birmingham Co., Inc.. Ansonia, Conn., died Sept. 5 at his home in Buffalo, N. Y. He directed the activities of the physics laboratory at Buffalo.

Joseph H. Hazley, for more than 25 years connected with the Jacobs Mfg. Co., Hartford, Conn., died Aug. 4. He was sales manager for many years, a vice president at the time of his resignation from active service in 1945, and when he died was a member of the board of directors.

Henry Wehrheim, president of the Wehrheim Machinery Co., Newark, N. J., died Aug. 20.

Albert G. Bladholm, president of Iron & Steel Products, Inc., Chicago, died recently at the age of 43.

Walter McFaddin, Cincinnati district manager of American Machinist for 25 years until his retirement in 1936, died on Sept. 6 at San Diego.

LITTLE CHAMP CUTS KEYWAYS IN . . .

MILLING CUTTERS—PULLEY HUBS—GEARS—ETC.

IN LESS THAN A MINUTE!

BY SAVING MAN-HOURS IT PAYS FOR ITSELF IN NO TIME. At some time or another every shop has occasion to cut keyways in gears, collars, pulley hubs, couplings or other miscellaneous parts, but these jobs never seem to call for an expensive setup. Compute the man-hours required to accomplish these infrequent jobs, however, and they'll come to a substantial amount. The combination of a Little Champ Keyway Broach Set and a Threadwell Arbor Press will handle these odd jobs efficiently and quickly. The Little Champ cuts standard keyways in an average speed of less than a minute. Can your shop match that time?

Little Champ Keyway Broach Sets in sturdy metal boxes with wooden fillers come complete with broaches, shims, and bushings in keyway sizes from 1/32" to 3/4" and in 14 models including both carbon and high speed steel broaches. We'd be glad to send Bulletin 434 giving detailed information.

THREADWELL RATCHET ARBOR PRESS

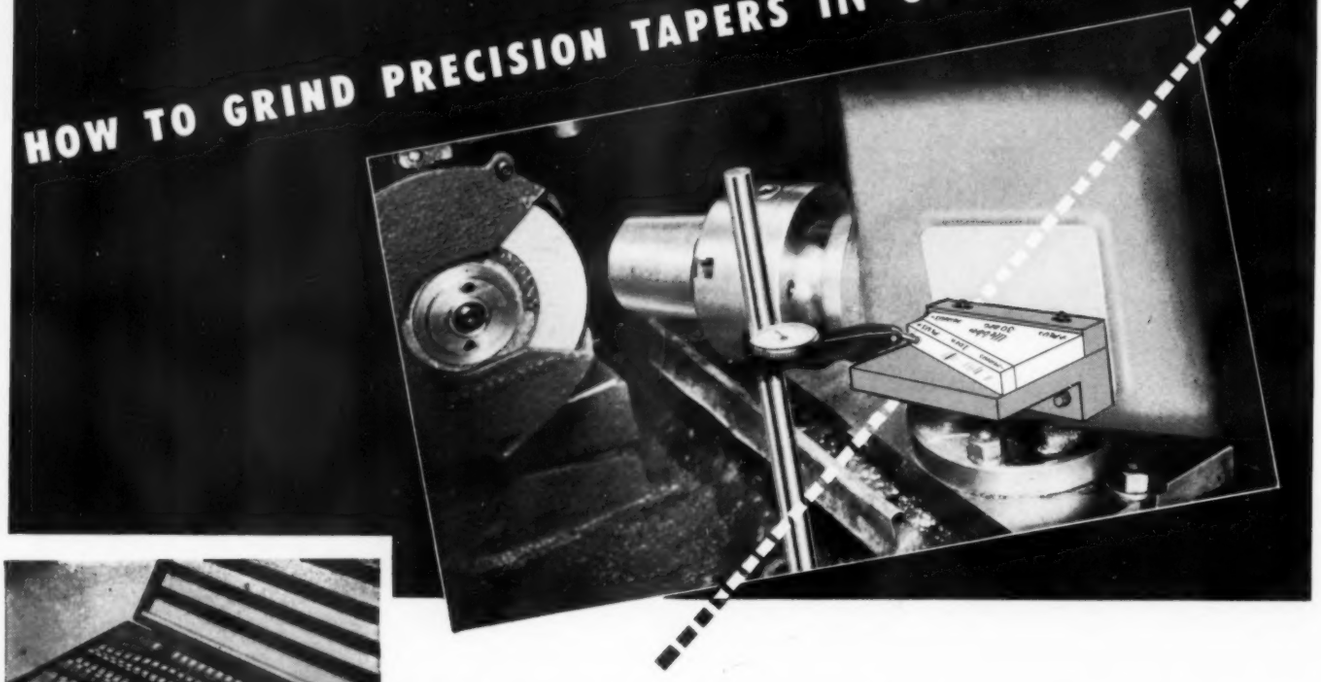
This sturdy machine tool equipped with rapid hand wheel positioning is designed to cut accurate keyways up to ⅜" wide in a minimum of time. It has a leverage of 48 to 1 with a 15" hand stroke. Normal duty pressure provided is 1½ tons. Height 23". Weight 155 lb.

Threadwell

"TOOLS OF DISTINCTION"

Threadwell Tap and Die Company, Greenfield, Mass., makers of Threadwell Taps, Fixed Gages, Dies, Counterbores, Twist Drills, and other fine cutting tools.

HOW TO GRIND PRECISION TAPERS IN ONE SETTING



84B—84 block set (steel)
Accuracy: .000008....$235.00

Angle Gage Blocks increase speed and precision of angle inspection.

Both internal and external tapers can be ground on any universal grinding head to an accuracy measured in millionth parts of a circle through the simple application of Webber Angle Gage Blocks.

The trial and error of conventional methods is eliminated. What's more the taper is true to tolerances that are difficult to maintain with usual procedure. The method is not limited to a single gage. Every setting can be inspected in a few seconds making it unnecessary to use the time of a top notch tool-maker to achieve the necessary precision.

Write for bulletin of special angle gage applications—find out how angle blocks save hours of time each week and maintain positive control over angle grinding.

WEBBER GAGE COMPANY
12901 Triskett Rd., Cleveland 11, Ohio

These are the direct factory representatives who can tell you about the advances in precision measurement that Webber has made possible.

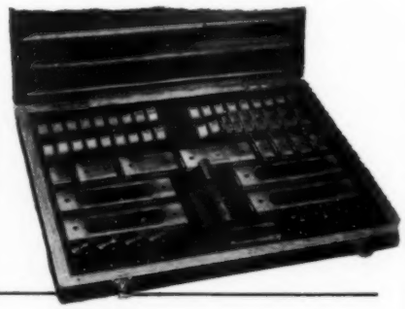
TRIPLEX SUPPLY CO.
830 N. Third St.
Milwaukee 3, Wisc.
Marquette 7568

●

O. A. MUENZ CO.
239 Bloomfield Ave.
Bloomfield, N. J.
BLoomfield 2-7307

Carblox Wear Gages add the wearing qualities of carbide to any standard steel block set. Two sizes $21.50 and $27.50.

Webber
MICRO-ACCURATE GAGE BLOCKS and FIXTURES

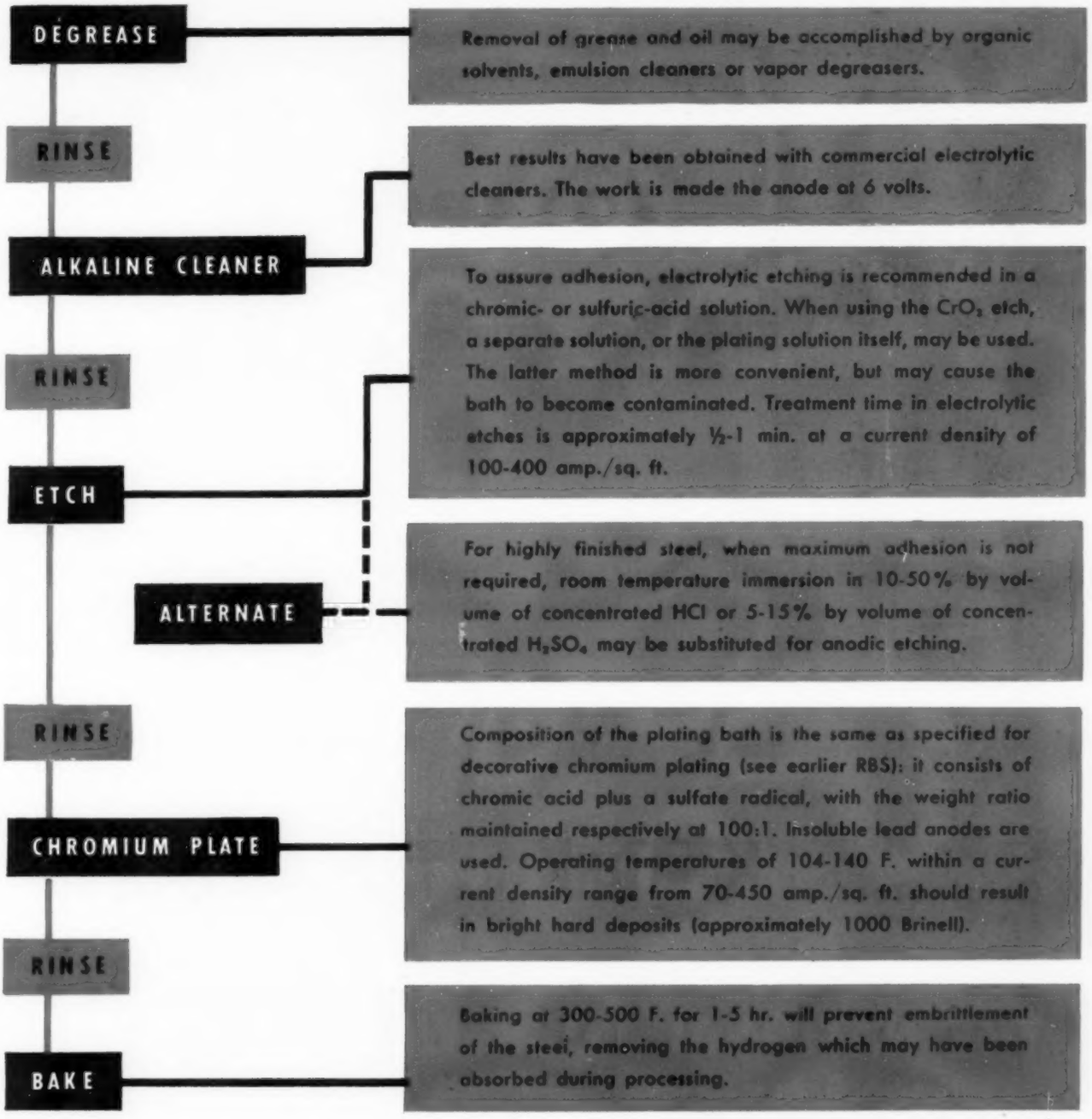


Transferring the extreme precision of gage blocks directly to the work without time taking precautions is one of the outstanding advantages of Webber Heavy Duty Gage Blocks and Fixtures.

Process Sheet For Industrial Chromium Plating

BY GEORGE BLACK

INDUSTRIAL uses of chromium plate are based on an unusual combination of properties: high hardness, low coefficient of friction, high seizure resistance and excellent corrosion resistance. General practice in the deposition of heavy coatings is to plate from 0.001 to 0.003 in. more than is desired, and then to grind or polish to the required dimensions. Very thin coatings, 0.0005 in. and thinner, have been employed successfully on metal cutting tools; the heavier deposits are used for rolls, drums, drawing dies, molds, shafts and similar parts. Industrial, or hard chromium, deposits, are used for the building of worn surfaces, the creation of bearing surfaces and for the facing of parts to resist erosion, corrosion or wear.


DEGREASE
Removal of grease and oil may be accomplished by organic solvents, emulsion cleaners or vapor degreasers.
RINSE
ALKALINE CLEANER
Best results have been obtained with commercial electrolytic cleaners. The work is made the anode at 6 volts.
RINSE
ETCH
To assure adhesion, electrolytic etching is recommended in a chromic- or sulfuric-acid solution. When using the CrO_3 etch, a separate solution, or the plating solution itself, may be used. The latter method is more convenient, but may cause the bath to become contaminated. Treatment time in electrolytic etches is approximately ½-1 min. at a current density of 100-400 amp./sq. ft.
ALTERNATE
For highly finished steel, when maximum adhesion is not required, room temperature immersion in 10-50% by volume of concentrated HCl or 5-15% by volume of concentrated H_2SO_4 may be substituted for anodic etching.
RINSE
CHROMIUM PLATE
Composition of the plating bath is the same as specified for decorative chromium plating (see earlier RBS): it consists of chromic acid plus a sulfate radical, with the weight ratio maintained respectively at 100:1. Insoluble lead anodes are used. Operating temperatures of 104-140 F. within a current density range from 70-450 amp./sq. ft. should result in bright hard deposits (approximately 1000 Brinell).
RINSE
BAKE
Baking at 300-500 F. for 1-5 hr. will prevent embrittlement of the steel, removing the hydrogen which may have been absorbed during processing.

Strange as it seems, there are still a few!

There are still a few machines or products that are designed without spring washers. But these oversights will be corrected because engineers everywhere are realizing that all bolted assemblies should be protected by live spring washers.

Otherwise the friction of metal on metal inevitably wears down the contacting parts; loosens them. The nut may not turn on its bolt—in fact, it can't turn while there is pressure on the threads—but the other parts wear loose under vibration. Always have, always will.

If your bolted assemblies are not protected now—redesign today. Specify National Kantlink Spring Washers—the strong helical springs that expand as wear occurs. They'll hold all parts tight longer. They'll help you avoid looseness, rattling and oftentimes real damage.

Write for descriptive folders today.

Originators of KANTLINK the long-range spring washer

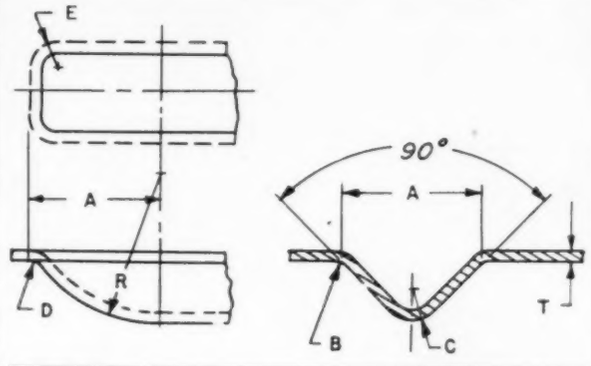
THE NATIONAL LOCK WASHER COMPANY

Newark 5, New Jersey — Milwaukee 2, Wisconsin

Stamping Data . . . II

These practices are followed by automobile manufacturers and agricultural-implement makers and are incorporated in their handbooks of engineering standards

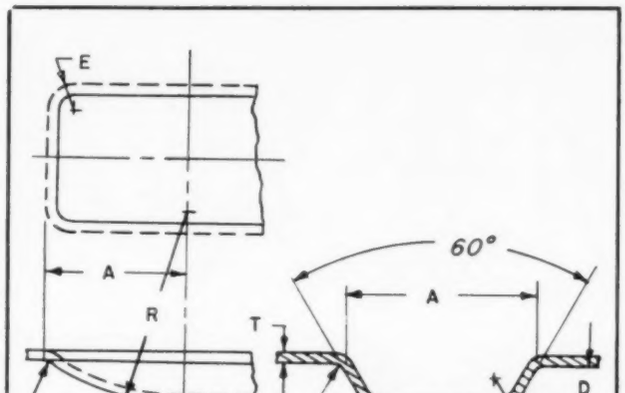
STRENGTHENING BEADS



A	B Radius	C Radius	D Radius	E Radius
.25	T	3T	3T	2T
.38	T	3T	3T	2T
.50	T	3T	3T	3T
.62	3T	5T	3T	3T
.75	4T	6T	3T	4T
1.00	4T	6T	3T	4T

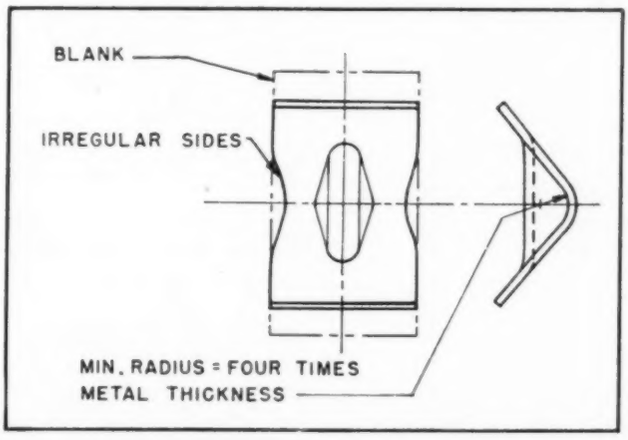
Maximum radius as determined by "T", and multiples of "T", is not to exceed .25 of an inch.

These ribs have been designed so the angle of the sides will normally allow their use not only on flat surfaces but also on angular and curved surfaces without producing back draft. The radii are determined by substituting the metal thickness *T*, and multiples of *T*, in each instance, and do not exceed a maximum radius of 0.25 in. for the V-type ribs and 0.19 in. for the flat type ribs

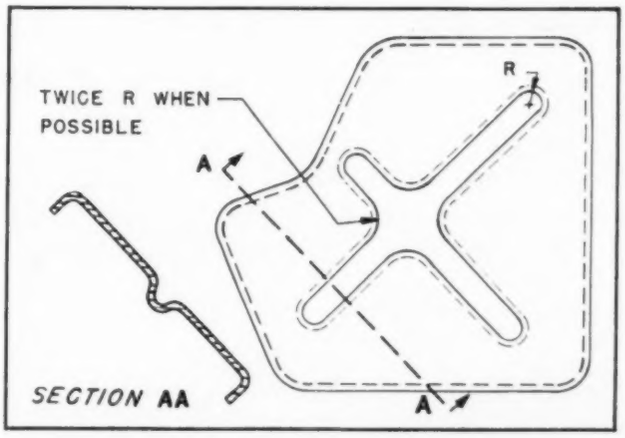


A	B Radius	C Radius	D	E Radius	F Radius
1.00	2T	3T	.25	5T	3T
1.50	2T	3T	.25	5T	3T

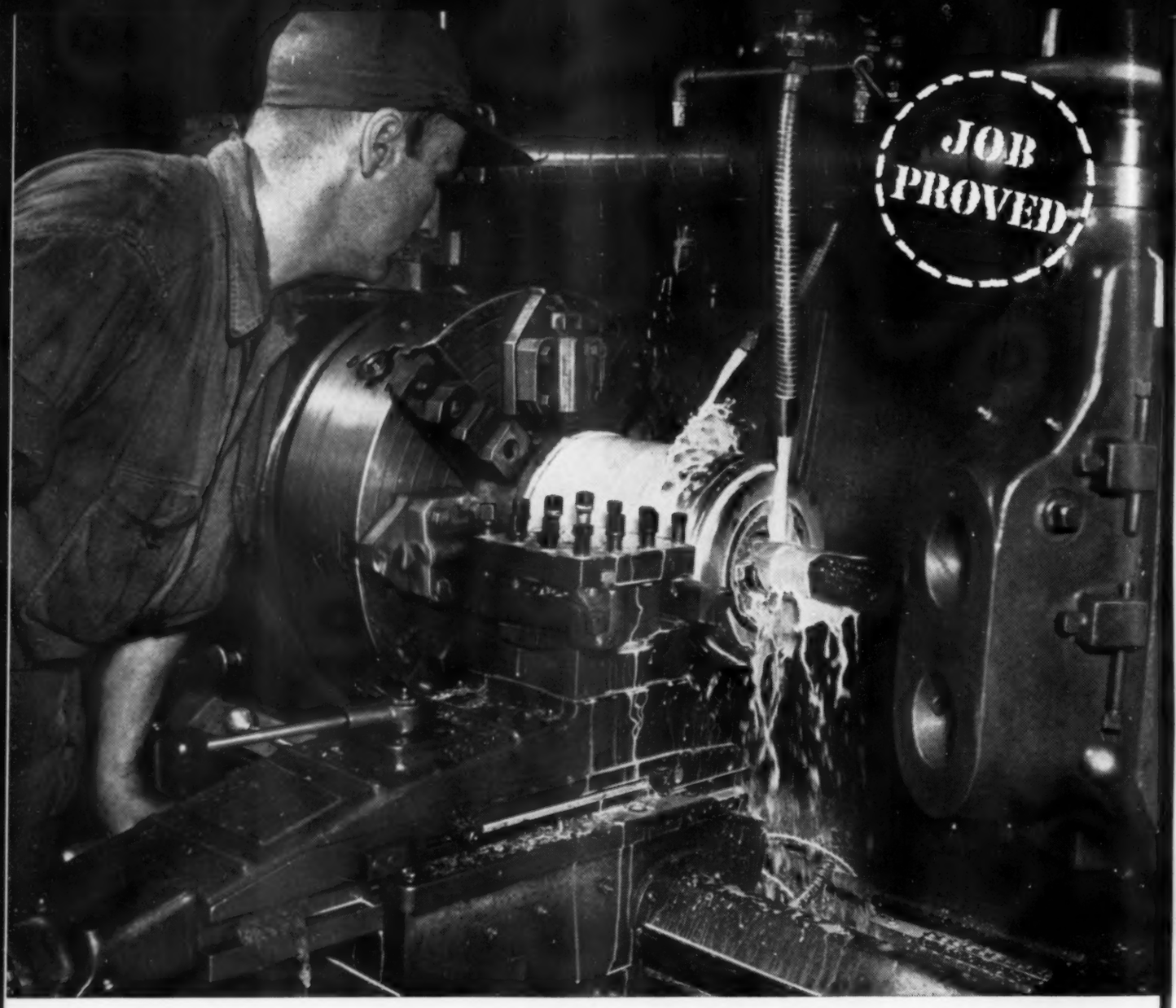
Maximum radius as determined by "T", and multiples of "T", is not to exceed .19 of an inch.



Ribs add rigidity to angles and flanges, and often the material thickness may be halved by judicious use of ribs, flanges and beads. When part is made of strip stock, show irregular sides to allow for rib



Weak or flexible stampings can be made rigid with beads and ribs. Beads of the type shown should be formed in the same direction as the outer flanges to facilitate die construction



MAKING THE BIG CHIPS FLY!

Sunoco Emulsifying Cutting Oil Is Used for Rough-Finishing of Heavy SAE 3140 Forgings

The correct cutting fluid is a big factor in the continuous heavy-duty machining of tough steel forgings on the machine shown above.

Machine: Warner & Swasey 4-A Heavy-Duty Turret Lathe

Material: SAE 3140 Forging

Operation: Roughing-Out Cap for Pile-Driving Machine

Cutting Fluid: 1 part Sunoco Emulsifying Cutting Oil to 20 parts water

Sunoco Emulsifying Cutting Oil is a viscous, self-emulsifying oil that quickly and easily forms a stable emulsion with water. It contains no animal or vegetable fats, and will not turn rancid.

Sunoco Emulsifying Cutting Oil meets the demand not only of tough cutting jobs, but also of a wide range of turning, milling and grinding operations calling for close tolerances and fine finishes. It is particularly efficient where precision machining at high cutting speeds is demanded.

For full information, for samples to test on your own machines, for the services of a cutting oil specialist, call your nearest Sun office. Or write Department AM-10.

SUN OIL COMPANY · *Philadelphia 3, Pa.*

In Canada: Sun Oil Company, Ltd.
Toronto and Montreal

SUN PETROLEUM PRODUCTS

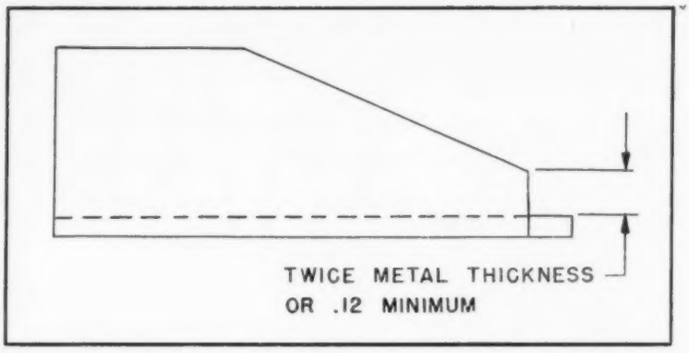
"JOB PROVED" IN EVERY INDUSTRY

SUNOCO

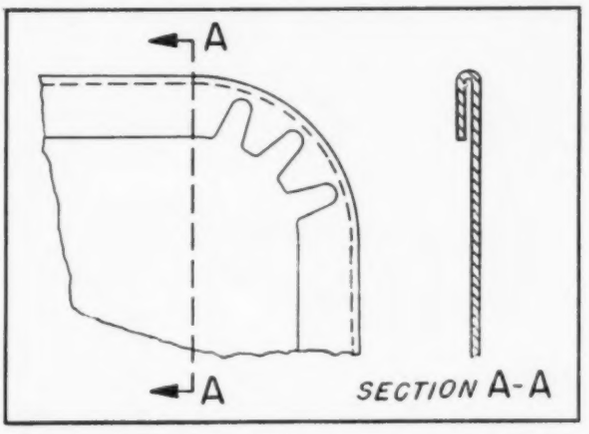
Stamping Data . . III

These practices are followed by automobile manufacturers and agricultural-implement makers and are incorporated in their handbooks of engineering standards

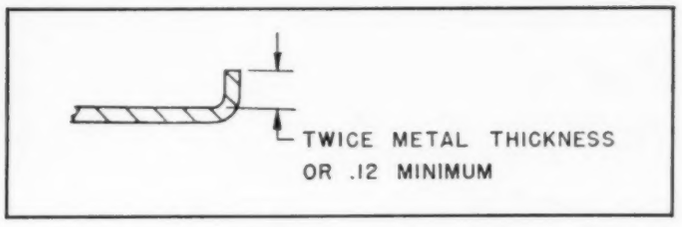
FLANGES



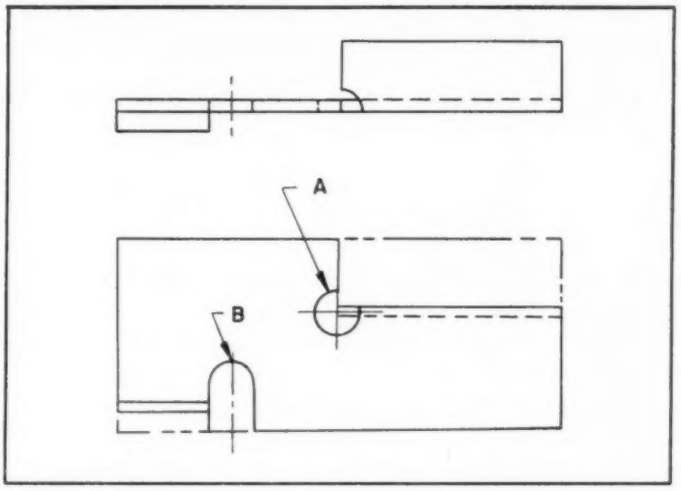
Tapered flanges should not taper to the face of the metal. They should be cut off so the narrowest section is at least twice the metal thickness, but not less than 0.12 in., measured from the inside of the metal.



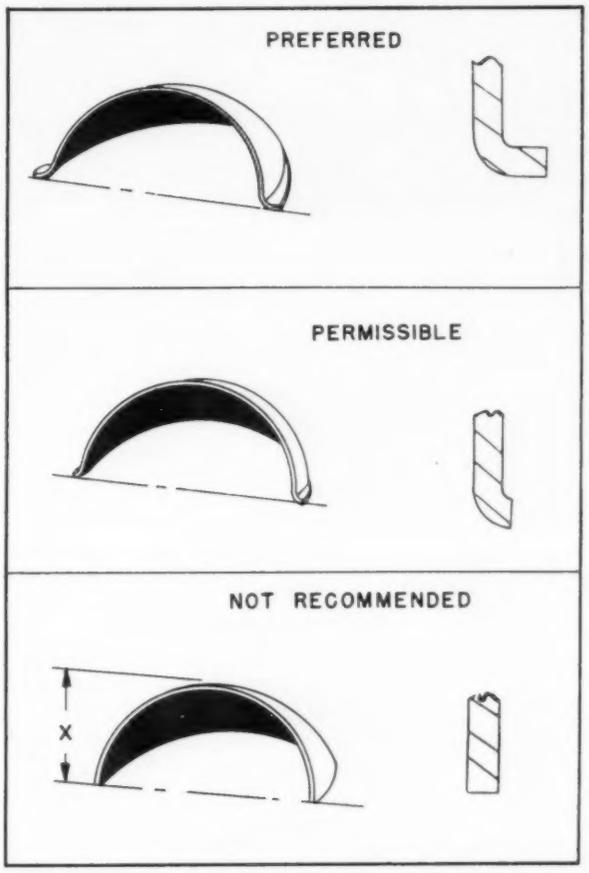
Notch the corner of a hemmed edge to eliminate gathering of the metal in the flanging operation



Outside flanges and flanges around openings should preferably have a height at least twice the metal thickness or a minimum of 0.12 in. on thin stampings



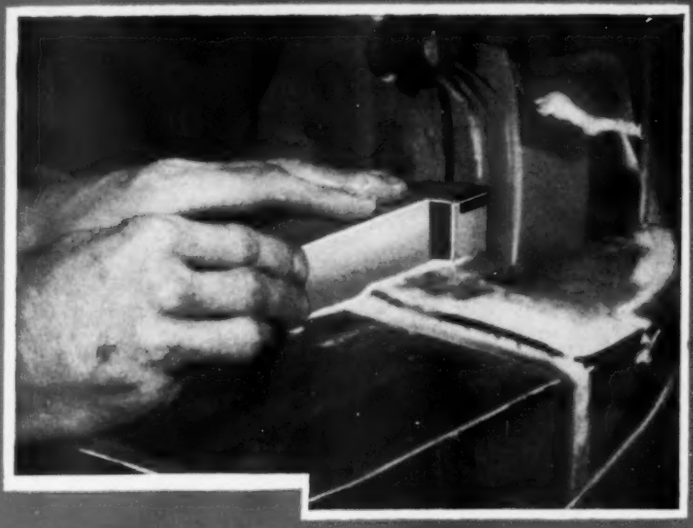
In highly stressed parts, when flanges extend over only a portion of the part, use a notch or circular hole to eliminate tearing of the metal. Hole *A* is used when the maximum possible flange height is necessary: notch *B* is specified when the flange can be shorter than the maximum possible height



Flange width should be selected to facilitate trimming: *preferred*—minimum flange width twice the metal thickness; *permissible*—a smaller flange can be used when a sharp edge is not objectionable: *not recommended*—absence of a flange requires an expensive trim if dimension *X* must be maintained

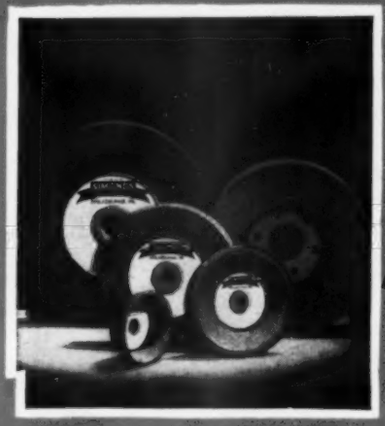
the grinding job

Off-hand sharpening of a carbide tipped tool, on 14" Hammond Tool Grinder. Widespread and increasing use of these tools makes this an important every day operation in many plants. Correct wheel selection for this specialized work is essential for efficient sharpening without damage to carbide tips.



the wheel

G Electrolon, GC80-I9-V3, 14" x 4" x 11", plate-mounted, Type PM, specially developed to prolong the efficiency of cemented carbide tools with economical grinding cost. Accepted as a standard of excellence throughout industry.



Borolon ALUMINUM OXIDE *Electrolon* SILICON CARBIDE

SIMONDS ABRASIVE CO.

PHILADELPHIA, PA.

Grinding Wheels

where to get it

Simonds Abrasive Distributors in all principal industrial centers in the U.S. and in many foreign countries carry stocks and can advise on grinding wheel selection. Write now for Bulletin ESA-181 "G Electrolon Wheels for Carbide Tool Grinding". Also request name of nearest distributor.

Every size and shape for every grinding job . . . centerless, crankshaft, cut-off, cylindrical, internal, knife grinding, mounted points, portables, roll grinding, saw gumming, snagging, surfacing (wheels and segments), tool and cutter, bricks, sticks, stones and abrasive grain for polishing, pressure blasting, anti-slip, etc.

SIMONDS ABRASIVE CO. Philadelphia, Pa. Grinding Wheels and Abrasive Products

SIMONDS Arvida, Quebec Electric Furnace Abrasives

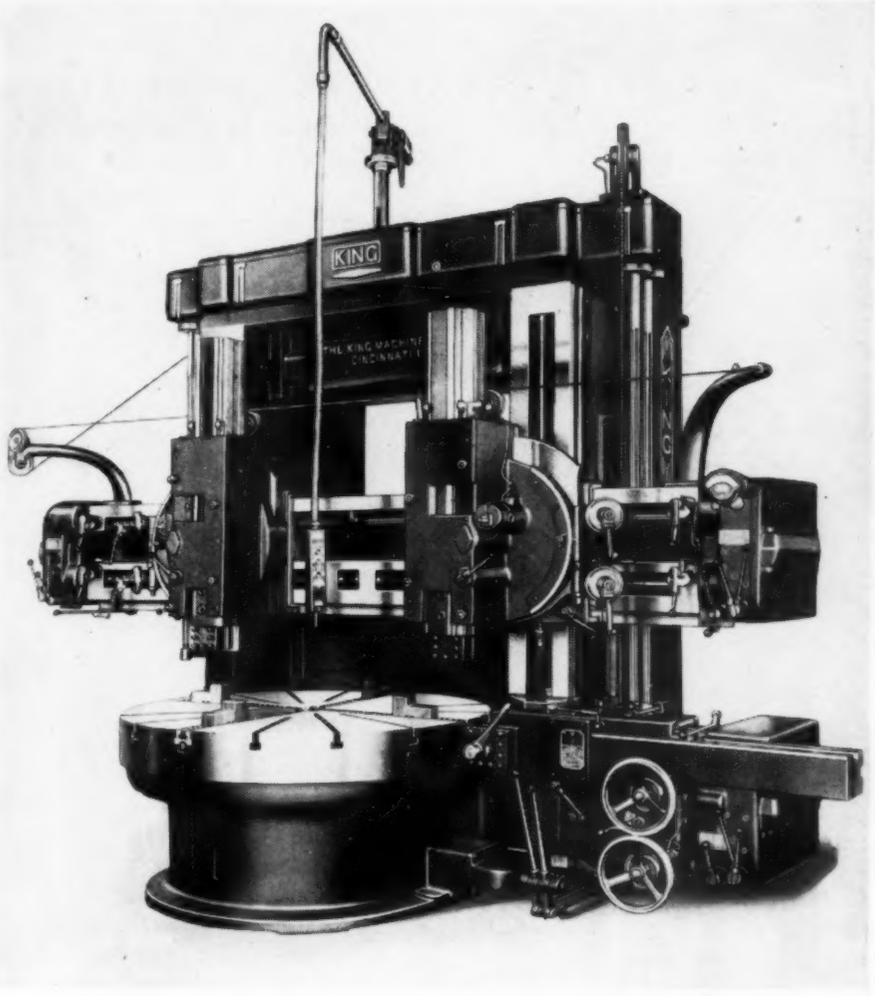
SIMONDS ABRASIVE COMPANY is a division of SIMONDS Fitchburg, Mass. Saws, Machine Knives, Files

Other Divisions: SIMONDS Lockport, N. Y. Special Steels — SIMONDS Montreal, Can. Simonds Products for Canada

Simonds Abrasive Company, a major manufacturer of grinding wheels and abrasive products exclusively, maintains a modern electric furnace plant at Arvida, Canada. Here the crude abrasive used in making Simonds grinding wheels is produced. Thus, product quality is controlled from the source, assuring you of lasting performance, top efficiency, better economy when you use Simonds Abrasive wheels on your grinding jobs.

SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PENNA. • DISTRIBUTORS IN ALL PRINCIPAL CITIES

Shop Equipment News



Vertical Boring, Turning Machines Offer Heavy, Rigid Construction

New series of vertical boring and turning machines is being produced by King Machine Tool Division, America Steel Foundries, Cincinnati, Ohio. Construction is claimed heavier and more rigid with increased power and a wider range of feeds and speeds.

Heads are equipped with 4 gibs and have 8 bearing surfaces. All controls are located in front of the machine. The illustrated 72-in. model has two ram heads and a side head. Other single-column models are available in 30-, 36-, and 42-in. sizes. Double-column models are available in 52-, 62-, 72-, 84-, 100-, 120-, and 144-in. sizes. Close tolerances are maintained at higher speeds with heavier feeds.

Eutectic Welding Rod No. 16 Made for Tight Steel Joints

Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N. Y., has produced Eutecrod 16 in a 1/32-in. size for tight steel joints. The patented alloy may be used in ring form and heated by torch or induction heating.

The rod is claimed a good replacement for silver solders and is recommended for aircraft instrument, and tool and die shops.

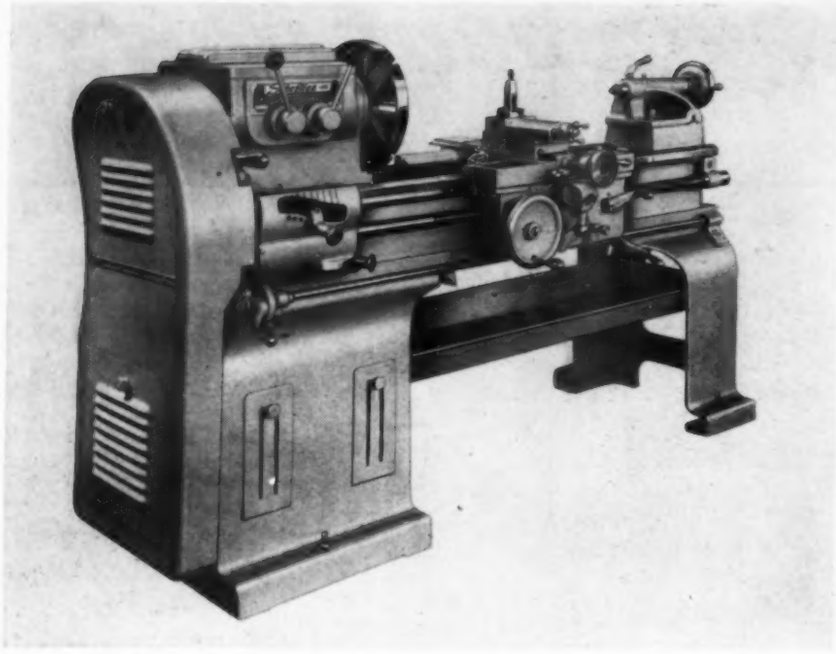
Standardized Tools for Keyway Broaching Are Offered by Zagar

Standard tools for broaching keyways on short-stroke broaching machines are offered by Zagar Tool, Inc., 23880 Lakeland Blvd., Cleveland 23, Ohio. Keyways ½ in. wide x ¼ in. x 4 in. long can be made on 20-in. stroke broaching machines, and keyways up to 1 in. wide x 1½ in. deep x 6 in. long can be made on 36-in. stroke broaching machines. Keyway broaching horns have been standardized by a system of interchangeable parts.

Outside Micrometer Attachment Allows Internal Measurements

An attachment for outside micrometers, the Rimat Microdapter allows measuring of internal dimensions. The tool is produced by Richards Machine Tool Co., Glendale, Calif.

Installation or removal takes only one minute. Measuring tips are bright, hardened tool steel, and other surfaces are finished blue-black.



Sebastian Varied-Type Lathes Offer 8-Speed Geared Heads

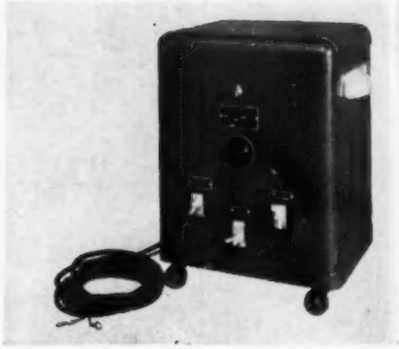
King Machine Tool Div., American Steel Foundries, Cincinnati, Ohio is now producing Sebastian Lathes. General-purpose, clutch-and-brake, and line-shaft drive types are in 12-in., 16-in.- and 20-in. sizes. Gap and metric screw types are in 16-in. and 20-in. sizes. All types offered feature 8-speed geared heads.

All headstock shafts have roller bearings and there are 57 feed and thread changes. Apron control, steady-rest, threading dial and two face-plates are standard equipment. Accuracy is said to be within 0.0005 in. at every point of alignment.

Production Service Retips and Salvages Scrap Production Punches

An-Dean Mfg. Co., Inwood, Ind., announces the Jiffy Production Service for punch press shops who operate dies, jigs and fixtures. The service is a new process of tipping and centering salvaged die punches.

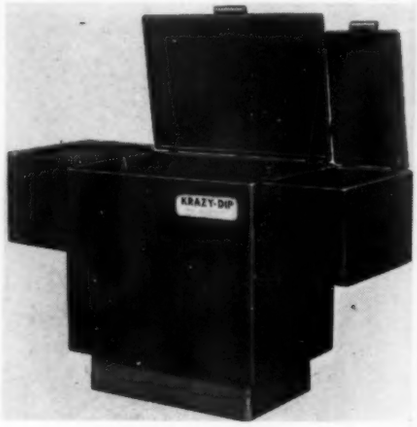
The advantage of this service utilizing the scrap punches is to save material, time and money, a short cut to maintain production. The customary routine of making new hardened die punches is eliminated. Rockwell hardness is retained, and, in most cases, is raised from 1 to 2 points. Scrap-hardened die punches are returned complete within 30 days.



Hobart High-Frequency Stabilizer Applies in Sheet-Metal Welding

Hobart Bros. Co., Troy, Ohio, is producing a high-frequency stabilizer for inert-gas, shielded-tungsten-electrode welding. The stabilizer is useful in sheet-metal work, low-current applications, vertical and overhead welding, and with twin carbon-arc torches.

It was developed especially to adapt ordinary ac. transformer welders for heliarc welding; to increase the impulses from 120 per sec. to 4,000 per sec. An intensity control is provided. Two sizes offer capacities of 300 and 500 amp.



Krazy-Dip Douses Small Parts 160 Times per Min. in Solution

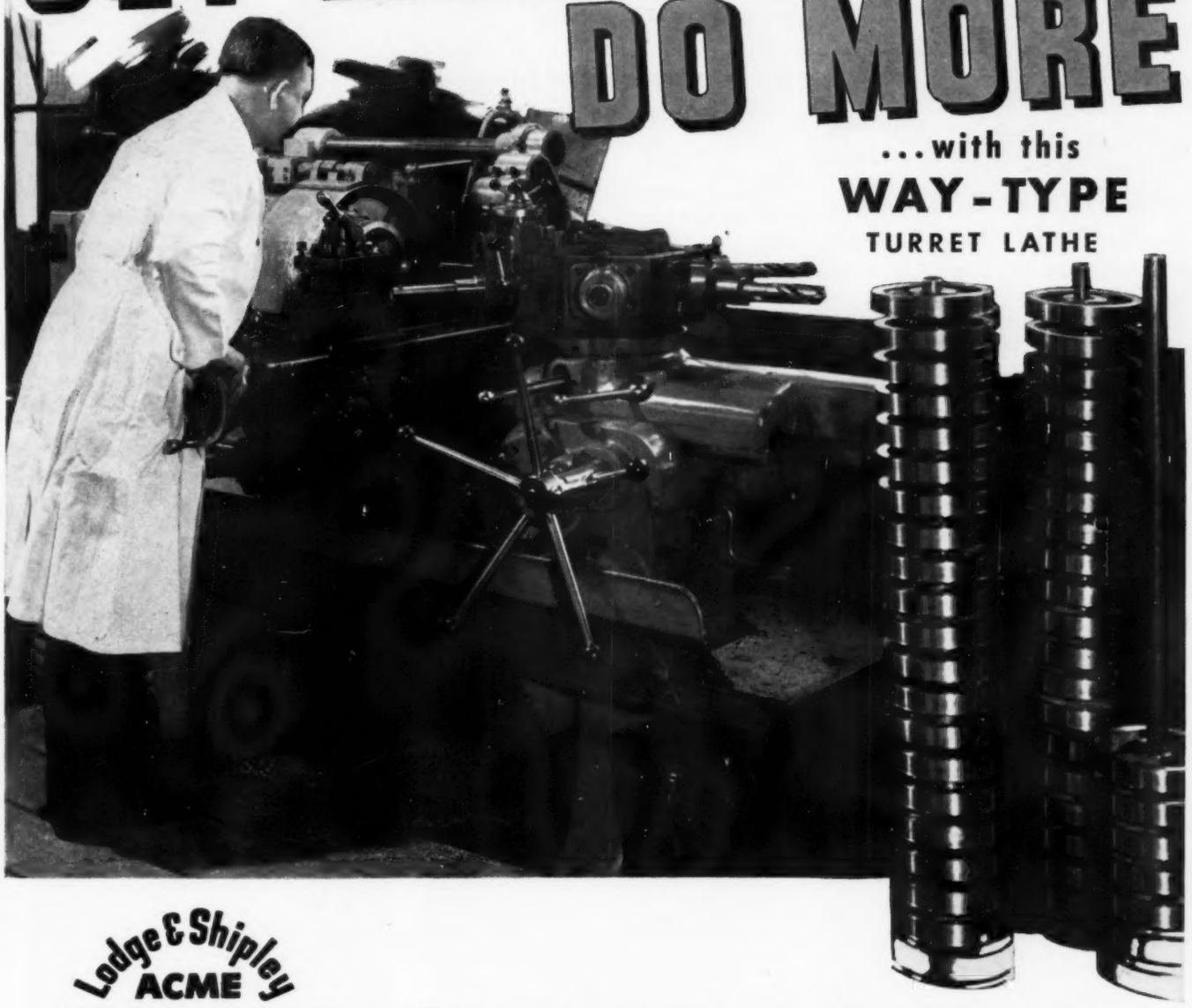
Magnus Chemical Co., Garwood, N. J., has recently introduced the Krazy-Dip cleaning machine for washing metal parts. Manual labor is required only to load and unload.

Mechanical agitation moves the parts into the cleaning solution 160 times a minute. Surfaces are claimed to be cleaned in up to 75% less time than by any other cold cleaning method.

Air consumption is 1 to 2 cubic feet per minute and a minimum air pressure of 50 psi. is all that is required.

GET MORE... DO MORE

...with this
WAY-TYPE
TURRET LATHE



Lodge & Shipley ACME TURRET LATHES

Illustrations show a Lodge & Shipley Acme Way-type in the shops of the Illinois Gear Co., Chicago, turning, facing, drilling and boring gear blanks. Used also for conventional turret lathe jobs, it combines many advantages requiring both Saddle and Ram-type lathes.

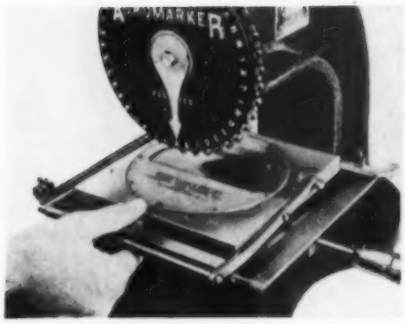
The Lodge & Shipley Acme Way-type combines the advantages of conventional Ram-type and Saddle-type lathes. This lathe is especially designed for jobs requiring the normal capacity of the Ram-type lathe and yet needing the additional turret support offered in Saddle-type lathes. It costs less, needs less floor space, uses less expensive tooling than the Saddle-type lathe . . . yet it operates with the ease and facility of the Ram-type lathe.

An additional feature of this lathe permits the turret to travel 20 inches compared to only 14 inches on the Ram-type. Rigidity is greater than the Ram-type because the turret is always supported on the bedways. For long hole boring this additional support offers greater accuracy not possible with the Ram-type.

Write for Booklet 667 giving full information on the Lodge & Shipley Acme Way-type Lathe.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO



Acromark Fixture Grips, Stamps, Releases Special Nameplate Shapes

The Acromark Co., Morrell St., Elizabeth 4, N. J., has developed a fixture for gripping, stamping and releasing special nameplate shapes. A flange at the rear slips under stamping bar of standard machines or the unit may be bolted into position.

Four small pins hold the nameplate into position. A series of holes in the spring pressure bar permits locating the pins to suit the shape of the special plate or plates. Size is 8 in. x 9 in. by ½ in. (illustrated), but it is available in other sizes both larger and smaller.

Rectifier Electrolyzes Nickel- And Copper-Base Solutions

Richardson-Allen Corporation, 15 West 20th St., New York City, has introduced special units for electrolyzing nickel and copper solutions. For 24-hour cleaning the output of these units can be connected to a small auxiliary tank and pump.

The solution is continually pumped to the auxiliary cleaning tank during working hours, cleaned, and pumped back to the main tank.

Since the rectifier is convection-cooled, no maintenance is necessary. Stepless controls permit any voltage control from 0 to 1 volt. Models offered include 50 amp., 100 amp., and 200 amp.

A unit with 1 volt—50 ampere rating weighs 75 lb. and measures 15 in. x 9 in. x 17 in.

Dry Molykote Lubricant Powder Withstands High Bearing Stress

Molykote, produced by the Alpha Corp., Greenwich, Conn., is a dry lubricant consisting of molybdenum disulfite powder. It has a low friction coefficient, and prevents galling, seizing, or metal-to-metal contact at bearing pressures over 100,000 psi. and at either high or low sliding velocities.

Ten ounces is claimed to cover 500 sq. ft. of smooth metal surface. It is suggested as a factory applied lifetime lubricant for mechanical articles. SAE 10 motor oil may be mixed with it to form a paste. The material is available at $3 per 10-oz. can.

American Optical Shield for Welding Weighs Only 11 Ounces

A lightweight, seamless hand shield, announced by American Optical Company, Southbridge, Mass., is recommended for short tack- and setup-welding jobs.

The shield has a 5½-in. fiber handle and, without the glass, weighs 11 oz. Standard filter glass plates can be installed in the face of the shield for eye protection.

Pioneer Chassis Punch Cuts Out Square, Angular Pattern Holes

Pioneer Broach Co., Los Angeles, Calif., is producing two sizes, ⅝ in. and ¾ in. of square chassis punches. They are claimed to permit punching square, rectangular, angles, or any square corner pattern-type hole from the nominal size up.

The tool is designed primarily for radio work. Preliminary holes for screw bolt must first be drilled or punched to permit using the tool.

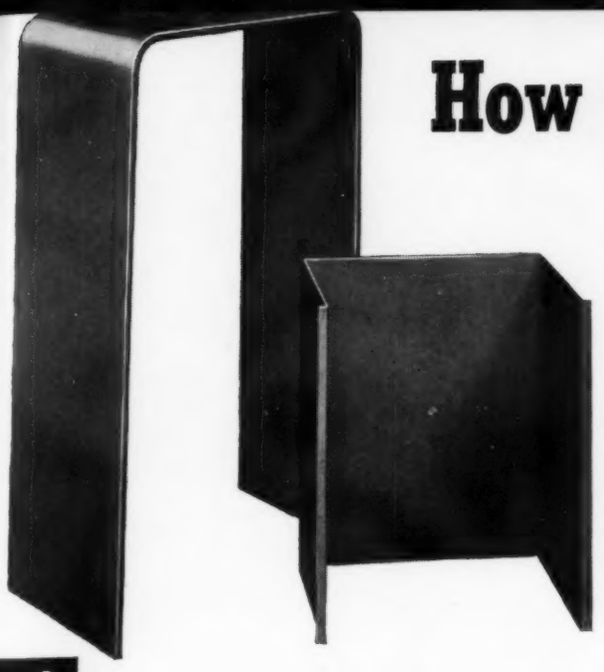
Fulmer Single-Spindle Machine Hones Diameters up to 4 Inches

A small size, single spindle, hydraulic honing machine, model 412, is being produced by C. Allen Fulmer Co., Cincinnati 2, Ohio. Internal cylinder diameters from ½ in. to 4 in. may be handled. Maximum stroke is 12 in.

Reciprocating speeds up to 80 fpm. are possible through hydraulic-cylinder power. A Vickers vane pump is driven by a 3-hp. motor. The 1¼-in. spindle has a No. 3 Morse taper and three speeds obtained through the use of cone pulleys and a V-belt.

Coolant works from a 45 gal. reservoir and is delivered by a 1/10-hp. pump.

How to *Form* metal cabinets on a PRESS BRAKE!



By extending bed and ram beyond the ends of the press and installing tangent bending mechanisms, BATH has added cabinet forming to the already wide range of functions of its STURDYBENDER Press Brake.

Now it is possible to do a complete job on one machine—blanking, perforating, notching, bending of flanges *and forming*. Obviously, this method provides a tremendous savings in the handling of materials, and eliminates the need for special forming equipment. The tangent bending mechanism is adjustable, to permit forming a wide variety of shapes. Cabinets for refrigerators, washing machines, deep freeze units, vending machines and other similar products are already being formed by this means.

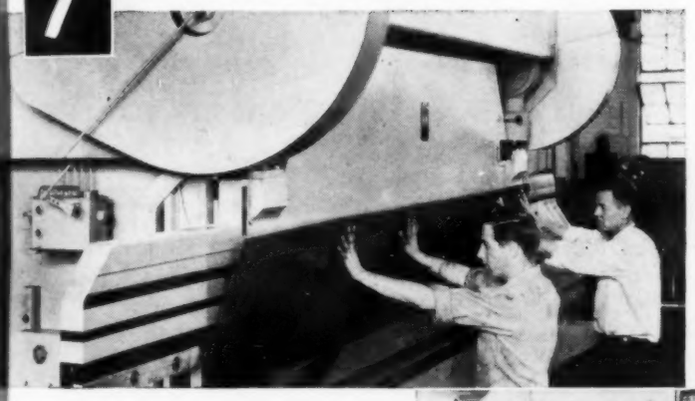
Since more and more manufacturers are finding the STURDYBENDER tangent bending device an economical answer to their cabinet forming problems, you, too, may be interested in the details. A letter will bring full information.

The CYRIL BATH COMPANY

6910 MACHINERY AVENUE

CLEVELAND 3, OHIO

1



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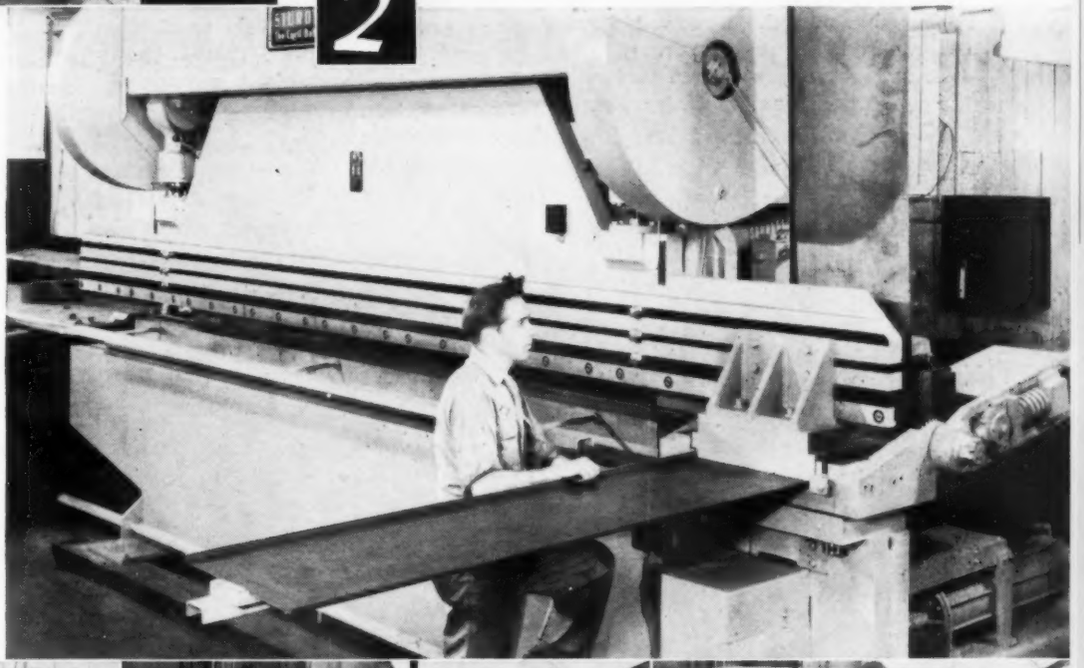


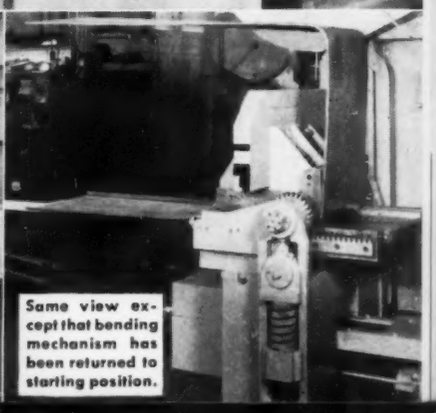
First step in production of refrigerator shell is forming 90° flange and lock flange on sides of flat sheet, conventional press brake operations.

Sheet is then inserted in tangent bending device and the first top corner bend is made. Buckling or wrinkling of flanges at the corner radius is avoided.

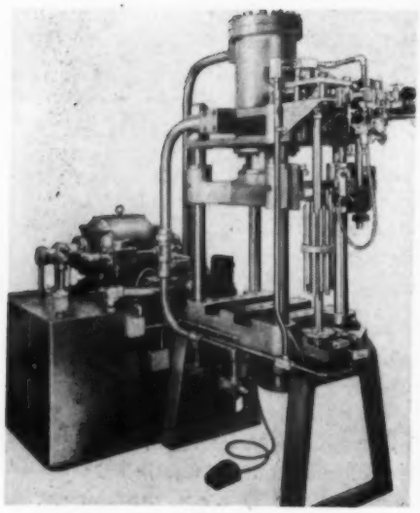
Sheet is moved further into the machine and second corner is formed. Once machine is set up, duplication of parts is automatic and very accurate.

3

Rear view of Step 3, showing bending mechanism at completion of bend.



Same view except that bending mechanism has been returned to starting position.

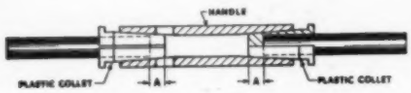


Hunter 5-lb. Load Tester Is Coil-Spring Inspection Unit

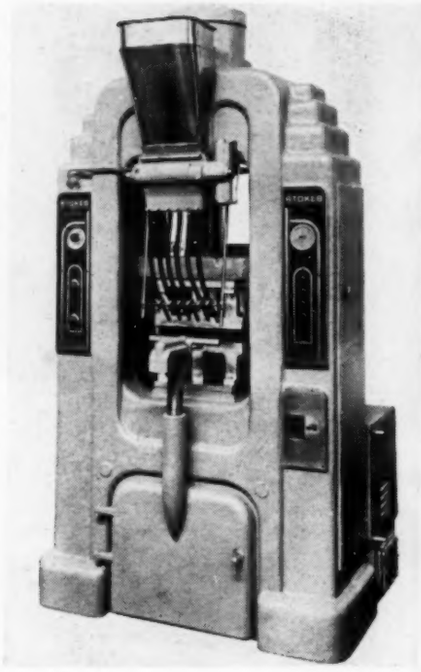
A new Model 217P load tester, designed by the Hunter Pressed Steel Co., Lansdale, Pa., has now been put into production. The new machine will test 50 to 200 springs with an accuracy of one part in 2500 at maximum load, and do it in from 15 min. to an hour. It will handle loads of up to 5 pounds, and spring lengths up to 12 in.

All compression-head surfaces are replaceable and the tension hook is ball-mounted to swivel freely. An overload spring, mounted between the weighing beam and the weight pan, prevents damage from excess load or shock. The pointer mechanism amplifies beam motion 10 times on a stainless-steel scale graduated in 40 divisions. The dial indicator has a 1-in. range with 0.001 graduations.

Compression and extension loading heads are adjustable for vertical positioning, yet positive alignment is maintained by split clamping mandrels carried eccentrically within specially drilled barrels. Wobble is prevented by keying the mandrel to a stainless steel column 27 in. high.

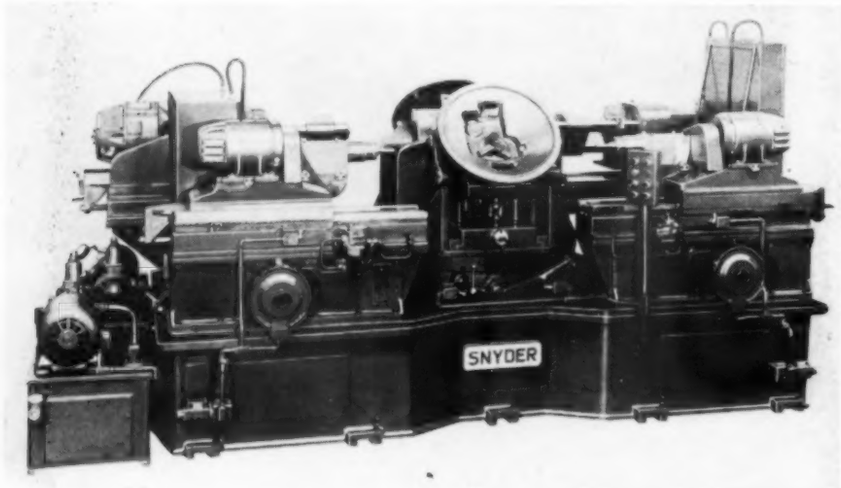


COLLET-HELD PLUG GAGES are made by Turner Bros. Inc., 2625 Hilton Road, Ferndale 20, Mich. The "go" and "no go" gage members are held at opposite ends of the gage handle by means of a self-locking plastic collet. These collets are made with a solid base "A," which stops the gage member when it is being fitted into the collet and prevents the gage from slipping through the collet into the handle. The self-locking device grips the gage and prevents it from sticking in the hole being gaged. Collets are black and red respectively to signify go and no go. Called Plast-O-Lock, the gages are available in a range of diameters from 0.0050 to 0.690 in.



Plastics-Molding Press by Stokes Has Slow-Close Automatic Control

The one-piece frame No. 235-A automatic plastics-molding press is announced by the F. J. Stokes Machine Co., 6120 Tabor Road, Philadelphia, Pa. The press offers an improved slow-close automatic control. High pressure at slowed-down press movement can be applied at any point in the molding cycle. The 50-ton hydraulic press includes a self-contained power unit.



CROSS-SHAFT HOLES are drilled and line bored in 70 different sizes and types of clutch housings by a special machine built by Snyder Tool & Engineering Co., E. Lafayette, Detroit, Mich. Two stations permit drilling and boring operations to be performed simultaneously. Estimated production is 65 pieces per hr. at 80 percent efficiency. Floor space required is 175 by 75 in. The two rear slides are equipped with single-spindle drillheads and are used to drill the cross-shaft holes. The two front slides are equipped with Parker boring spindles for finish-line boring the holes. Front spindles are provided with micrometer adjustment permitting precision setting of the finish-boring tools which are tungsten carbide

Twelve Tube-Bending Sequences Offered in Elmes 20-Ton Press

A new hydraulic tube-bending press having an unusually large number of bending combinations has been announced by Elmes Engineering Works, Chicago 7, Ill. Press allows any number of sequences up to the maximum of twelve, with adjustable bending depth and automatic reset together with a choice of four bending radii. Press capacity is 20 tons.

The press bed has two cushions. In line with each cushion are two bending noses, each having a different radius. An entirely new indexing device controls the sequence and depth of bends. After sequence has been completed, the index automatically resets to starting position. The foot-type control operates the press cycle, leaving operator's hands free to handle tubes. A total selection of 48 bending variations is possible on this machine.

LIKE FAMOUS WASHING-MACHINE MAKERS YOU, TOO CAN

Mangle Costs
Stop Profit-Shrinkage
Starch up Sales

with AMERICAN PHILLIPS SCREWS

LOSSES WASHED UP! Coin-slot washer-manufacturers can't afford to use slotted screws. For, as one maker says: "Slotted-driver gouges would cost us 50c to $5.00 to refinish a painted panel." American Phillips Screws stop all that. And they start new savings — *of several seconds per screw* — that add up as high as 50%.

SALES STARCHED UP! Unburred American Phillips Screwheads mean that coin-laundry customers can't snag the clothes they put into machines. And these stay-tight screws mean, too, that washers are less often down for repair. Find out what double-edged production and sales-spurs American Phillips Screws can apply to *your* product. Write.

4-WINGED DRIVER CAN'T SLIP OUT OF PHILLIPS TAPERED RECESS

AMERICAN SCREW COMPANY, PROVIDENCE 1, RHODE ISLAND

Chicago 11: 589 E. Illinois St. *Detroit 2:* 502 Stephenson Building

AMERICAN PHILLIPS *Screws*

ALL TYPES
ALL METALS: Steel, Brass, Bronze, Stainless Steel, Aluminum, Monel, Everdur (silicon bronze)

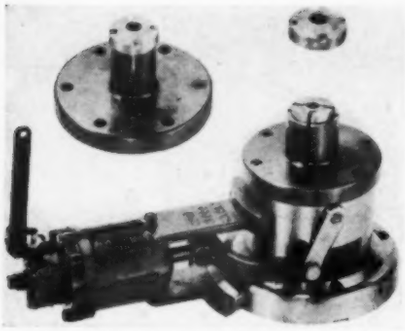
Hand-Operated Portable Elevator Offers a Lift Height of 62 in.

A lightweight, hand-operated portable elevator known as the Uplifter has been announced by Revolvator Co., North Bergen, N. J. The Uplifter weighs 415 lb., and has a turning radius of 45 in. The over-all height of the machine is 77 in. and the height of lift is 62 in. The Uplifter has a 24-sq. in. platform and the height when lowered is 4½ in. The lift is 2⅛ in. per turn of the crank for the 500-lb. capacity, and 1 1/16 in. for the 1000-lb. capacity.

Flex-O-Pic Grasps Small Parts

A specialty tool for picking up parts in hard-to-reach places has been announced by EMCO Enterprises, 6750 Stony Island Ave., Chicago, Ill. The Flex-O-Pic consists of the flexible cable shaft and two grabbing fingers.

The easily disassembled tool is claimed to be acid proof and is cadmium plated.

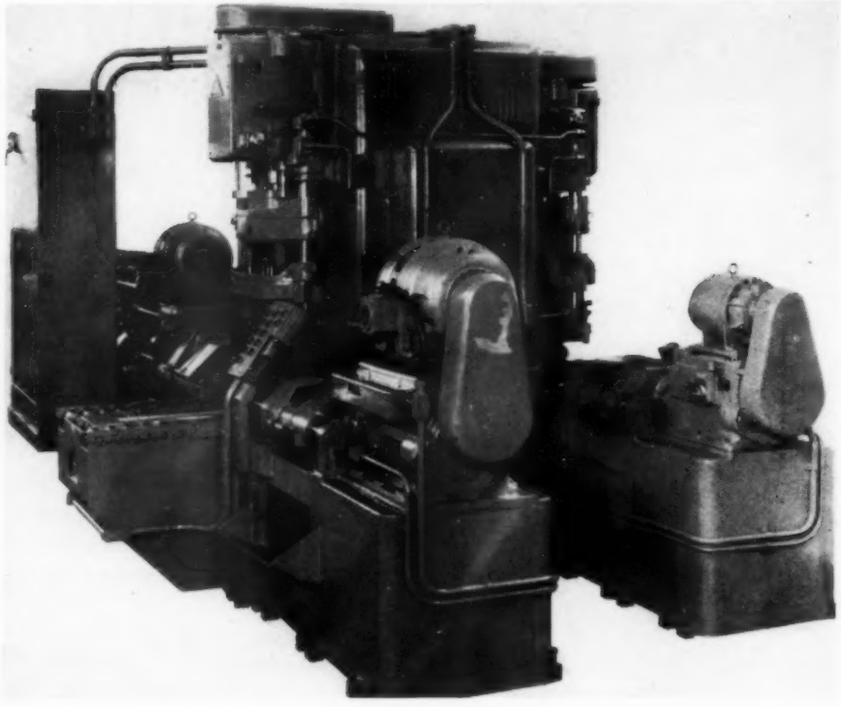


Internal-Expanding Collet Holds Longitudinal Position

A new internal-expanding collet, produced by the Zagar Tool Co., Cleveland, O., is designed to be used on any standard collet attachments. The collet is a flanged device with a protruding section that extends beyond the flange and is split in four ways. It is made of spring-tempered tool steel.

The action to pull the wedge is obtained by the collet-chuck mechanism. The internal collet is fastened with screws and is held concentric by a round seat or pocket. The pocket is ground concentric with the locating surface of the expanding portion.

The collet does not move in a longitudinal manner so that over-all dimensions on parts to be machined can be easily held. A cone-shaped wedge is used for internal holding.



LeMaire Hydraulic Line-Process Machine Drills Cylinder Blocks

A new, 74-spindle, special-purpose machine built by LeMaire Tool & Mfg. Co. for automobile manufacture drills, line reams, chamfers and counterbores holes in the tops and end surfaces of V-8 engine blocks.

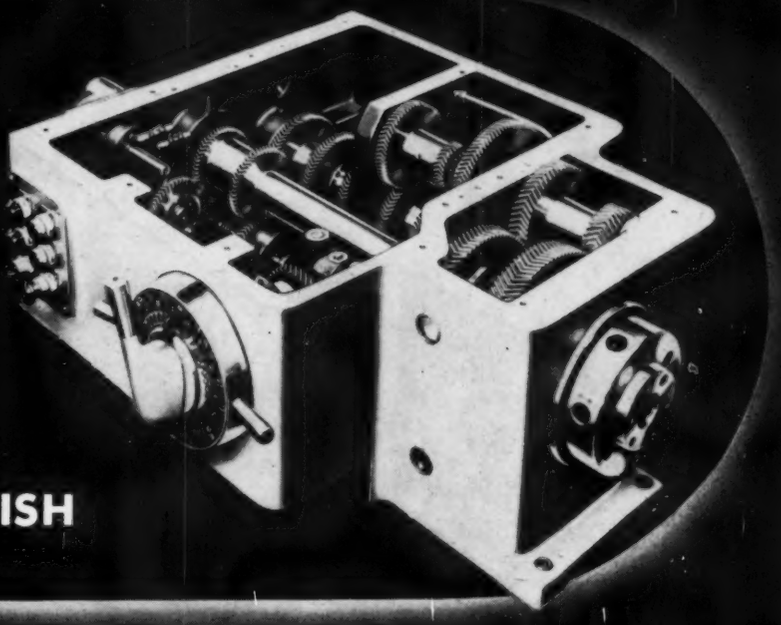
The machine has five stations: load; drill; idle; chamfer, ream and counterbore; and unload. A number of standard units are employed, which increases the salvage value of the machine. There are three No. 5000 twin-ram units and two No. 2000 twin-ram units all carrying multiple-spindle drillheads.

Hydraulically operated guide pins enter reamed holes in the bottom of the work for location. A hydraulic traverse bar moves the work along hardened steel rails from position to position. The complete cycle, started by a single button, includes the transfer of the parts, motion of locating pins, the actual operations, clamping and unclamping, and the withdrawal of the locating pins.

Conventional chip unloading chutes are employed, and helical gears are on all heads and standard units. Machine is automatic.

Smooth Flow of Power

MEANS SMOOTH PRECISION FINISH



● The Sidney Herringbone geared headstock is not only distinctive in design but based on sound engineering principles and proved by more than 20 years actual operation in Sidney Lathes.

Another feature that makes for accuracy is the three bearing spindle mounting which automatically compensates for expansion due to temperature rise.

These are only two of many distinguishing points of design that enable Sidney lathes to produce precision work, faster over longer periods.

Bulletins covering all sizes available.

SIDNEY HERRINGBONE GEARED HEADSTOCK

SIDNEY MACHINE TOOL COMPANY

BUILDERS OF PRECISION MACHINERY SINCE 1904 . . . *Sidney, Ohio*

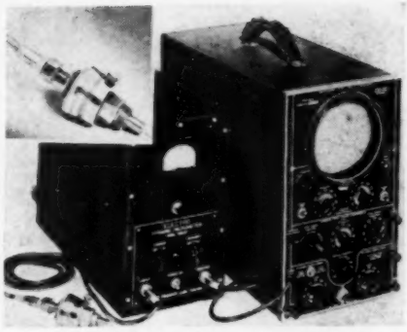
Square D Controller Operates Resistance-Welding Machine

A new Class 8992 Type BBG-1 combination controller developed by the Square D Company, Milwaukee, Wisconsin, provides complete electrical control for a small foot- or motor-operated resistance-welding machine. The single enclosure contains a NEMA 1A pneumatic weld timer, a size 1W, 100-amp., high-speed magnetic-welder contactor and a control transformer.

The initiating switch and control circuits operate at 110 volts isolated from the power supply. The timer is mounted on a Safront swingout panel with the adjusting dial on the front and all energized parts in the rear of the controller.

Controllers are designed to permit either common or separate control supply connections. A dual primary control transformer may be connected for 110, 220 or 440 volts 60 cycles, or for 380 volts 50 cycles.

TELESCOPIC WORKSAVER is made by the Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia 24, Pa. The 120-in. tilting-fork model has a capacity of 3000 lb. The truck travels at 2 mph. under full load, lifts 8 fpm. with a 2500-lb. load, and tilts a full 18° in 10 sec. The over-all dimensions are 33 x 64 in.



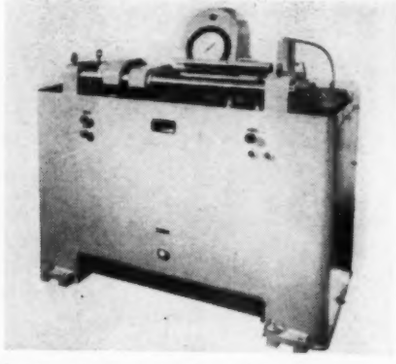
Electro-Dynamic Micrometer Measures Slight Movements

A dynamic micrometer, manufactured by Electro Products Laboratories, Chicago, Ill., will measure movement, radial displacement or vibrations of ferrous parts when used in conjunction with the DuMont 208 Oscillograph or equivalent.

Readings are taken from a conventional micrometer sleeve which is calibrated in thousandths and tenths. Amplification is done at a constant "carrier" frequency which changes in amplitude with the vibration or displacement. The device is claimed accurate up to speeds of 20,000 rpm.

Total weight is 27 lb., and measurements are 12⅛ in. by 7 1/16 in. by 18½ in. There is no calibrating or interpolating necessary to obtain a reading.

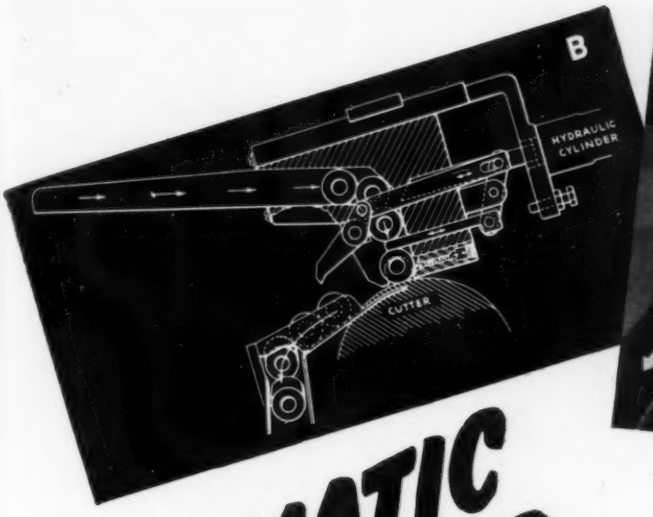
FIVE HUNDRED FIFTY cast-iron transmission clutch gears per 8-hour shift including down-time for tool sharpening is the output of this single spindle gear-cutting machine at an automotive transmission plant. Using no coolant, this Michigan Tool Company Shear-Speed gear shaper cuts all teeth of one 4-in. dia. 51-tooth, 1-½-in. face-width clutches simultaneously—in just 33 seconds. The HSS tools are sharpened after each run of 1600 gears. Tools have a negative rake of 3° and are designed so that four different gears can be cut with the same tooling. Made by Michigan Tool Co., East McNichols Rd., Detroit, Mich.



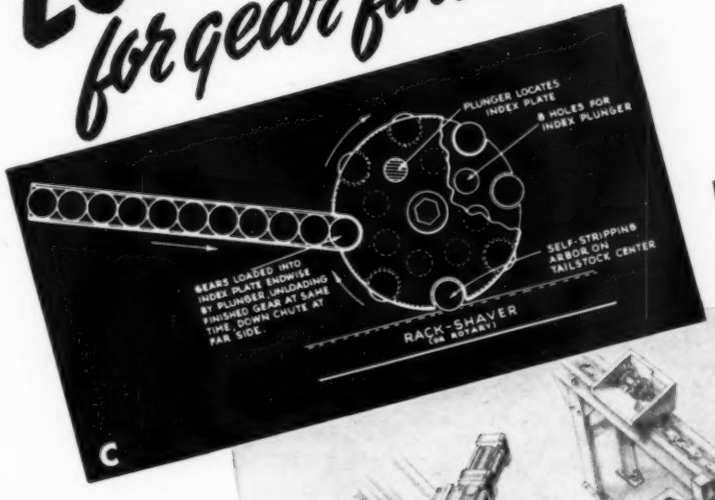
Hydrostatic Testing Machine For Pressures to 20,000 psi.

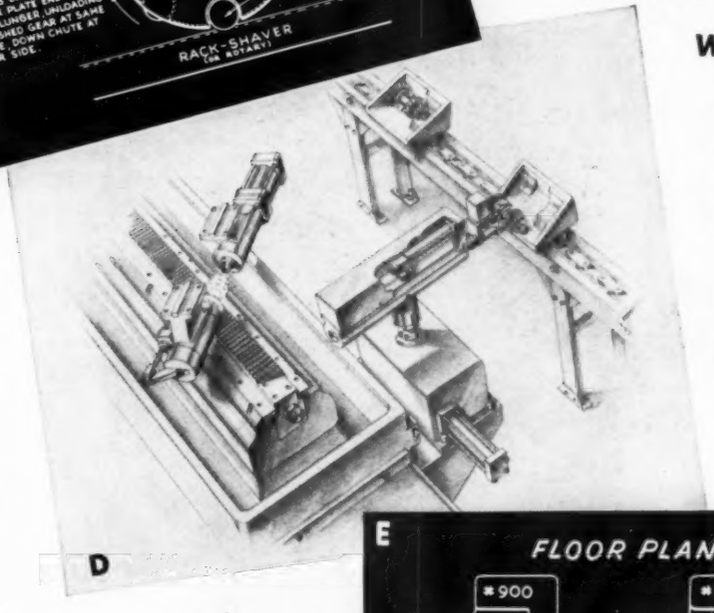
A hydrostatic testing machine for pressures up to 20,000 psi. has been designed by City Steel Testing Machines, Inc., 884 Livernois Ave., Detroit 4, Mich. The tube testing machine seals the end of the tubing without any perceptible flare.

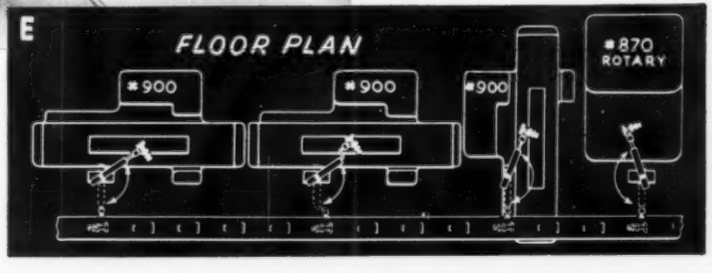
Cycle time can be predetermined, and the machine automatically reverses. The cycle is 4 sec. A hydraulic pump and motor, electrical timers and switches, solenoids, relays and valves are included. The control panel is integral with the base. Floor area is 15 sq. ft.



AUTOMATIC LOADERS *for gear finishing*


PLUNGER LOCATES INDEX PLATE
8 HOLES FOR INDEX PLUNGER
SELF-STRIPPING ARBOR ON TAILSTOCK CENTER
GEARS LOADED INTO INDEX PLATE ENDWISE BY PLUNGER, UNLOADING FINISHED GEAR AT SAME TIME, DOWN CHUTE AT PAR SIDE.
RACK-SHAVER (OR ROTARY)
C





A.
Gravity feed No. 1 for rotary finishers.

B.
Gravity feed No. 2 for rotary finishers.

C.
Indexing feed mechanisms for pinions, used on rack or rotary machines.

D.
Jaw type, for large gears or clusters on rack or rotaries.

E.
Using 4 automatic loaders to completely finish 70 cluster gears per hour without manual handling.

WHAT THEY WILL DO:

1. Eliminate manual handling of individual gears IN and OUT of machines.
2. Boost production *automatically* to as many as 300 gears per hour per machine. (Fig. A, B or C.)
3. Cut machine idle time to 2 secs. or less per gear.
4. Enable finishing of cluster gears without any manual handling between machines. (Figs. D and E.)
5. Eliminate mounting gears on arbors.

WHERE YOU CAN USE THEM:

On either rack or rotary machines, whether new or already installed.

WHAT TYPE TO USE:

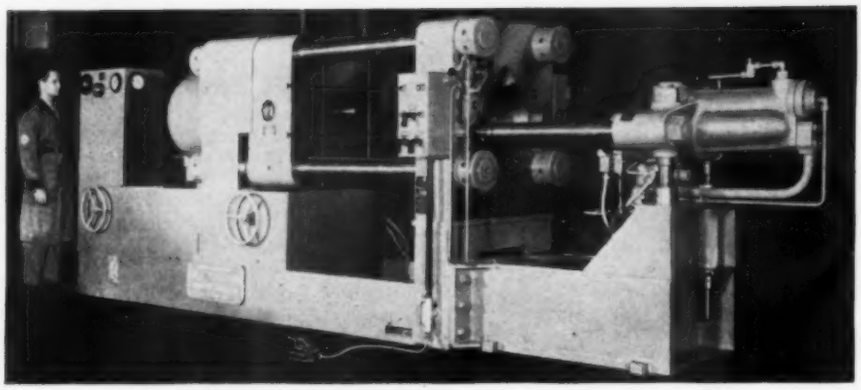
There is no one best type. Shown here are several.(**). We will be glad to recommend the best type for your production requirements.

***For complete description of these devices ask for Gear Highlights, Vol. 12, No. 1.*

ORIGINATORS of GEAR SHAVING

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT 12, U. S. A.

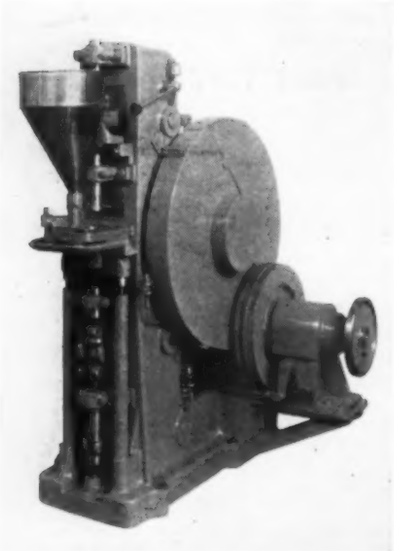


HPM Cold-Chamber Machine Die Casts Aluminum, Magnesium, Copper Alloys

Hydraulic Press Mfg. Co., Mt. Gilead, Ohio, has announced a cold chamber machine for the production of die castings of aluminum, magnesium and copper-base alloys.

Porosity is minimized by sustaining high injection pressures. Clearance is provided below die-space mounting to accommodate core pulls attached to the bottom of the die. Aluminum castings weighing up to 10 lb. can be mass produced.

The injection unit is a double-acting ram which actuates a plunger that forces molten metal from the cold chamber into the die cavities. Hydraulic ejection is automatic. Maximum clamping pressure is 400 tons. Die platens are 38 in. x 38 in., and die space is 23 in. by 38 in.

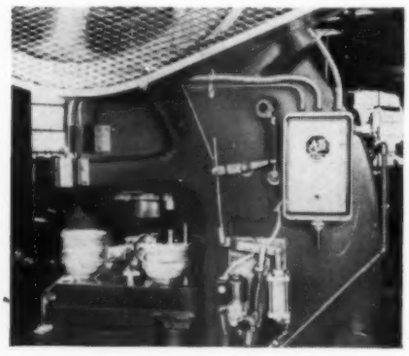


Stokes 12-ton High-Speed Press Processes Powdered Metal Parts

F. J. Stokes Machine Co., 754 Drexel Bldg., Philadelphia 20, Pa., is producing a 12-ton press for high-speed manufacturing of powdered metal parts.

The G-4 press built of special Meehanite is capable of applying pressures simultaneously from both top and bottom. A movable core rod can be arranged to drop before the die is filled and then automatically push up from below to assure uniform distribution and a full die cavity. A secondary lower punch can also be operated in the press.

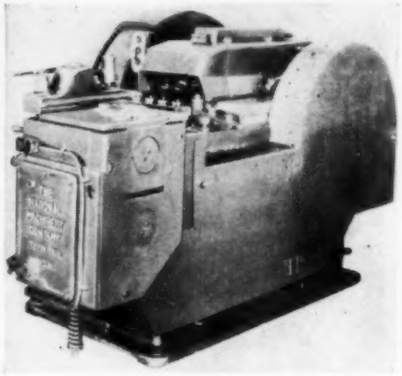
Maximum die fill is 4 in., maximum diameter of piece is 2¼ in. The 3-hp. variable-speed unit drive is provided with a lever-operated clutch and brake.



Punch-Press Guard by Graham Is Air, Electrically Operated

Graham Specialty Co., 12925 Auburn, Detroit 23, Mich., is producing an air and electrically operated punch-press guard; a set of pushbuttons, located far enough apart so the operator can only touch one hand on each button are installed on punch presses.

The usual treadle is replaced by an air thruster and anti-repeat switch which will allow the ram to descend only once. Equipment can be operated automatically for handling long stock by a foot attachment.



National Cold-Nut Former Makes Blanks from 5/16 in. to 1 in.

The National Machinery Co., Tiffin, Ohio, is manufacturing cold-nut formers for producing hexagonal nut blanks. Nut types produced include standard single and double chamfered nuts, wash-faced nuts, castellated nuts, hug lock nuts, Marsden lock nuts, and jam nuts.

Internal stresses are claimed to be avoided since a minimum of cold forging is done. A four-station transfer mechanism turns the nut blanks 180° after each stroke. Gathering, blanking, forming, and punching are carried on simultaneously and a complete nut is produced on each stroke.

Output of sizes from 5/16 in. to 1 in. ranges from 100 nuts to 40 nuts per min. Scrap loss is claimed to be held between 10 and 15 percent.

The Super B Blueprint Machine Takes Materials to 42 in. Wide

The Super B blueprint machine produced by Ozalid Div., General Aniline and Film Corp., Johnson City, N. Y., accommodates materials up to 42 in. in width. Dimensions are 84½ in. width, 78 in. height, and 38 in. depth.

The machine operates on 220-volts ac. 60-cycle current. Operating speed may be varied between 0 and 25 ft. per min. Exposure and dry development are combined in one automatic operation. Power is supplied by ¾-hp. capacitor induction motor.

18 Molds . . . Machined

● Total turning time is seven hours—on a set of 18 inserts (six of each) for a multiple-cavity gasket mold.

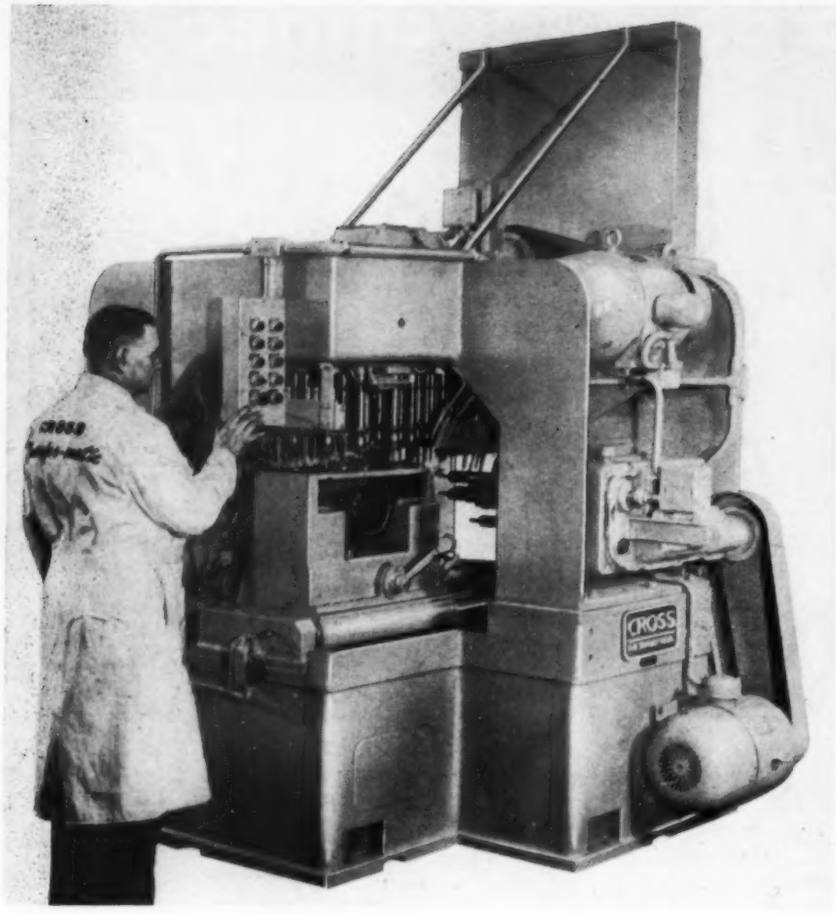
That's the Monarch-Keller production . . . contrasted with 60 hours, the time it took by more conventional machining methods. If you're looking for similar savings, it will pay you to investigate contour turning the Monarch way.

The Monarch-Keller was the *original* tracer-controlled lathe; over 1,000 are now in use. These Keller controls, adaptable to any Monarch Lathe above the 12″ size, permit fast, accurate, *economical* turning, facing and boring of irregular contours from a thin metal master template. When not in use, the controls can be quickly disconnected to permit regular turning work. For complete details, ask for our new bulletin 2401, on the improved Monarch-Keller Form Turning Machines.

ACCURACY · ECONOMY · LONG LIFE
Monarch
TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER* —— TURN TO MONARCH



Cross Tapper Threads 60 Holes In Automatic Transmission Case

A special machine tool for moderate production has been announced by the Cross Company, Detroit 7, Mich. The new machine taps 60 holes in an automatic transmission case at the rate of 65 pieces hourly.

The work cycle is automatic and push-button controlled. Station 1 taps 25 holes, an automatic shuttle carries the part to station 2 and 35 more holes are tapped, after which the part is returned for unloading.

Each tapping spindle is equipped with an individual leadscrew feed, with a safety device to eliminate tap breakage if holes have not been drilled in the previous operation, and with a lubricating system which provides a measured amount of oil with every cycle.

Because only moderate production was required, unnecessary features were eliminated to provide a special machine with many manufacturing advantages at low original investment.

Livingston Portable Cleaner Mixes Detergent and Steam

A portable industrial steam cleaner is announced by Livingston Engineering Co., 100 Grove St., Worcester 5, Mass. The unit includes a crusher nozzle with hand control. Hose and pressure tank are mounted on a steel dolly. Detergent or soap solution is added to the steam in the pressure tank.

The unit operates on 220 volts ac. current and requires a 26-in. x 42-in. floor space. Capacity is 28 kw.

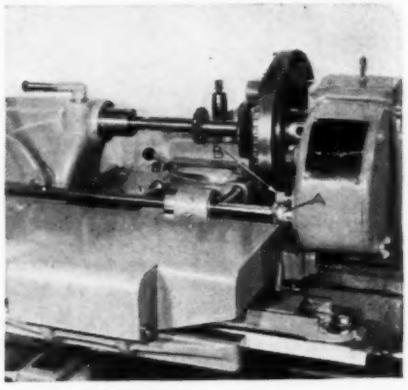
Dempsey Continuous Salt Bath For Heat-Treating Small Parts

A continuous salt bath unit, manufactured by Dempsey Industrial Furnace Corp., 133 Main St., Springfield, Mass., operates continuously in heat-treating small parts. The unit includes two pot furnaces, a quench unit, wash unit and a dryer. Handling equipment is hydraulically operated, but manually controlled. A charge up to 125 lb. can be handled.

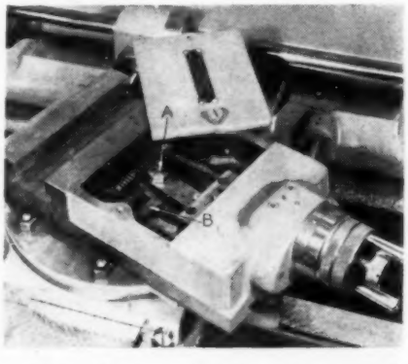
When cyanide hardening screws to a case depth of approximately 0.003 in., the capacity of the unit is 300 to 500 lb. per hr. finished work. Oil, gas or electricity may be used as furnace fuel.

Sidney Attachment Includes 4-1 Spindle Reducer for Relieving

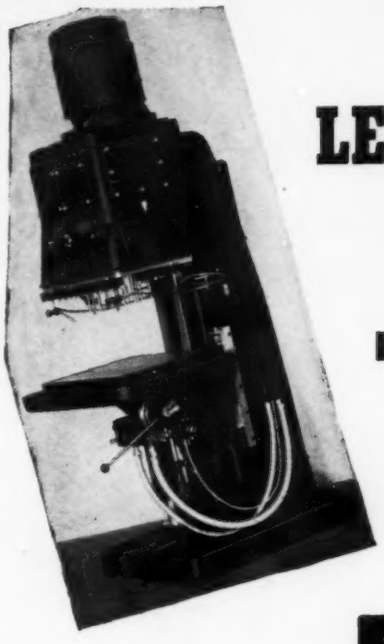
Sidney Machine Tool Co., Sidney, Ohio, announces a new universal relieving attachment. It incorporates a 4 to 1 spindle-speed reducer integral with a change-gear box, thus eliminating the need for two-speed motors.



Universal joints have been eliminated entirely and the complete driving mechanism is mounted on back of the lathe. Timer "A" in the photograph above is provided to enable the operator to pick up any relief at any point. Clutch lever "B" disengages relieving attachment drive for conventional turning. Angular and spiral relieving can be accomplished with this attachment.

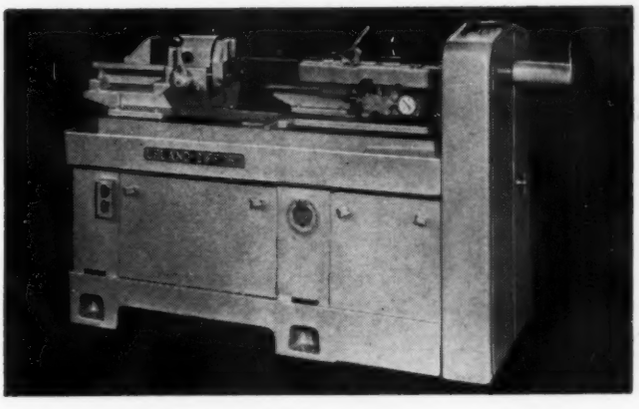


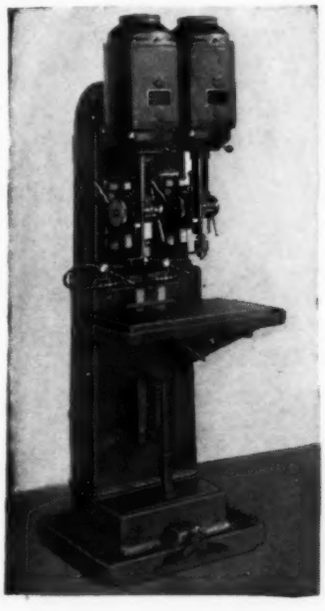
Cam throw adjustment is made by loosening stud "A" shown in the second illustration and sliding arm to required location on shoe "B".



THE LELAND GIFFORD LINE

includes a drilling machine
to meet your every need.
Individually motored spindles
Speeds instantly selected
Wide speed ranges





NO. 1 SUPER HIGH SPEED

NO. 2 TO CAPACITY OF NO. 2 M.T.

NO. 3 TO CAPACITY OF NO. 3 M.T.

NO. 4 FOR HEAVY DUTY

. . .

VERTICAL AND HORIZONTAL

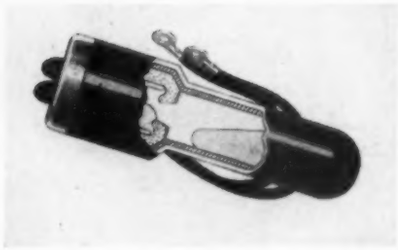
DEEP HOLE DRILLING MACHINES

16 SPINDLE ADJUSTABLE

LELAND-GIFFORD

WORCESTER 1, MASSACHUSETTS, U. S. A.

Parts and Materials



"Lo-Temp" Bronze-Base Alloy Fuses with Metals for Repair

John Hewson Co., 70 Wall St., New York 5, N. Y., is distributing a low-temperature, bronze-base alloy for permanent repairing. The "Lo-Temp" alloy handles like putty at 300 F. and can be machined at room temperatures.

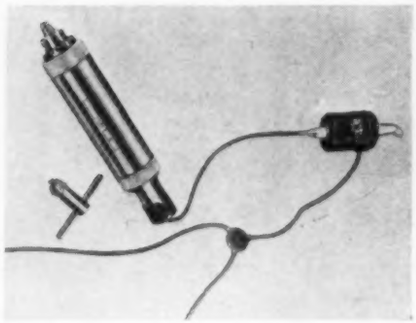
The material is claimed to be corrosion-proof, and to work with any metal except aluminum alloys. A gasoline torch and a putty knife are equipment necessary for working.

Continuously Charging Intensifier Provides a High-Pressure Stroke

Elmes Engineering Works of American Steel Foundries, 1002 Fulton St., Chicago 7, Ill., has announced an air-actuated, continuously charging intensifier. The Power-petuator provides a continuous high-pressure stroke and maintains any desired pre-set ram pressure on small hydraulic presses.

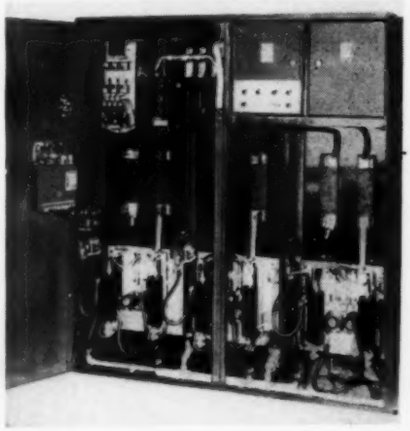
The unit is set for ram pressures by an air pressure-regulating valve. Air power is taken from shop lines and is claimed to be negligible.

Suggested applications are molding plastics and rubber, laminating and force assembling. Capacity is 50 tons pressure.



DETACHABLE RADIO HANDPIECE with Jacobs' chuck for flexible-shaft machines is available from L & R Mfg. Co., Arlington, N. J. The product may be used with any flexible-shaft unit. The aluminum-housed handpiece contains two pre-sealed ball-bearings and features a No. 0 Jacobs Chuck with 0 to 5/32 in. range.

MOTOR-GENERATOR sets are offered by the Motor Generator Corp., Troy, Ohio, to operate magnetic chucks of vertical-spindle and rotary surface grinders. Sets are available in generator capacities ranging from 500 watts through 25,000 watts, dc. Size of generator required depends upon the size and type of magnetic chuck



Weltronic Combination Relay Controls Automatic Weld Time

Weltronic Co., 19420 W. Eight Mile Rd., Detroit 19, Mich., offers model 312KS2, a 3-phase, multiple-control relay-timer in a single-panel unit. Complete remote control over 3, 6, or 9 transformer groups is possible with auxiliary timers.

The unit includes controls for 1, 2, 3; cascade; or simultaneous welding with independent dial adjustment of each timing phase. Circuit-breaker addition is possible with capacity up to 50,000 amps.

The Weltronic Water Saver is incorporated with solenoid-operated water valve and lines.

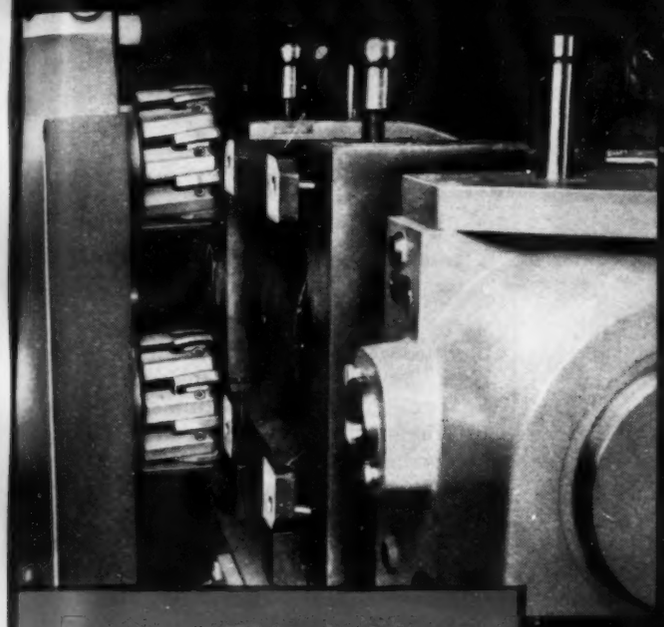
Durant Markets Stroke and Rotary Counter Attachments

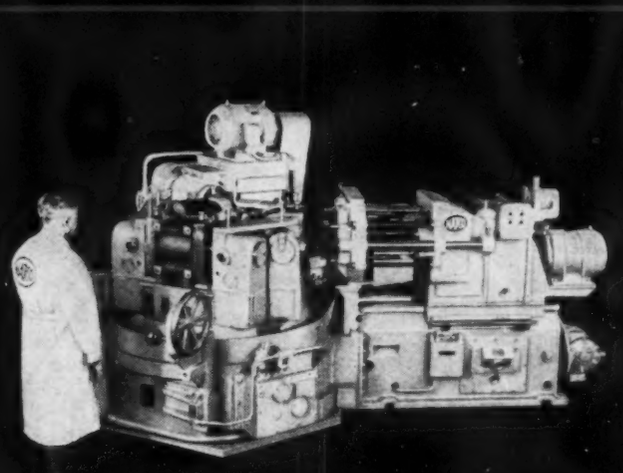
Reset-stroke and rotary counters Model Y are available from Durant Mfg. Co., 1945-B, North Buffum St., Milwaukee 1, Wis. The counters are designed especially for incorporation as an integral part of business machines, laboratory equipment and metal-working machines.

Stroke counters have a patented ratchet non-slip pawl drive mechanism, and the rotary style has a sleeve clutch mechanism. The window is made of Plexiglas. Operating lever is bright-plated brass with positive grip. Resetting to zero is made possible with a single turn of the knob.

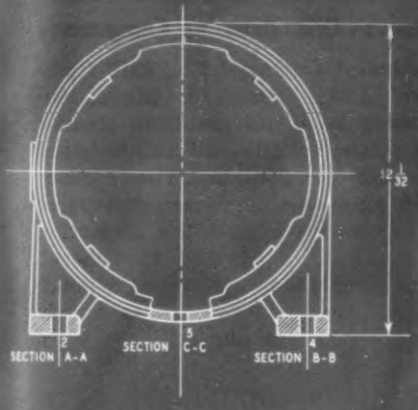
COMBINATION MILLING AND DRILLING

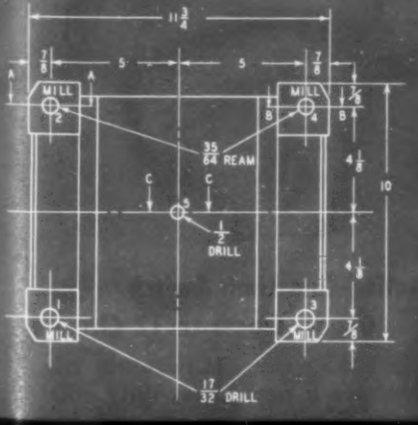
the feet of 8 different size frames





ONE OF 8 SIZES OF PARTS PRODUCED ON THIS MACHINE





Part — Stator Yoke
Material — Cast Iron
Production — 48 parts of any one of 8 sizes of parts per hour

POSITION NO. 1
Remove and load one part.

POSITION NO. 2
Mill 4 foot pads.

POSITION NO. 3
Drill 2 holes, #1 and #3 to 17/32" dia. Combination drill and ream 2 holes, #2 and #4 to 35/64" dia. Drill 1 hole #5 to 1/2" dia.

Extreme versatility is demonstrated by this NATCO two-way horizontal combination drilling and milling machine consisting of a traveling head milling unit and a B2FT HOLESTEEL unit. The HOLESTEEL unit has a special head bored for 8 drives and is equipped with 5 spindles. Milling unit has jump feed mechanism. Machine has 48 in. dia. 3 position automatic index rotating table and is arranged with hydraulic feed.

As outlined above, the machine produces any one of 8 different sizes of stator yokes at any one time—48 parts per hour. Part is located by a cone in the bores from both sides which also equalizes the part endwise, and part is located radially against the side of the feet.

A NATCO Field Engineer will gladly assist you in solving problems in your production. Mail us your inquiry today!

NATCO DRILLING, BORING, TAPPING AND FACING MACHINES

NATCO

NATIONAL AUTOMATIC TOOL COMPANY, INC., Richmond, Ind., U. S. A.
Branch Offices: 1809 Engineering Bldg., Chicago • 409 New Center Bldg., Detroit • 1807 Elmwood Ave., Buffalo • 2902 Commerce Bldg., New York City

Call a Natco Field Engineer

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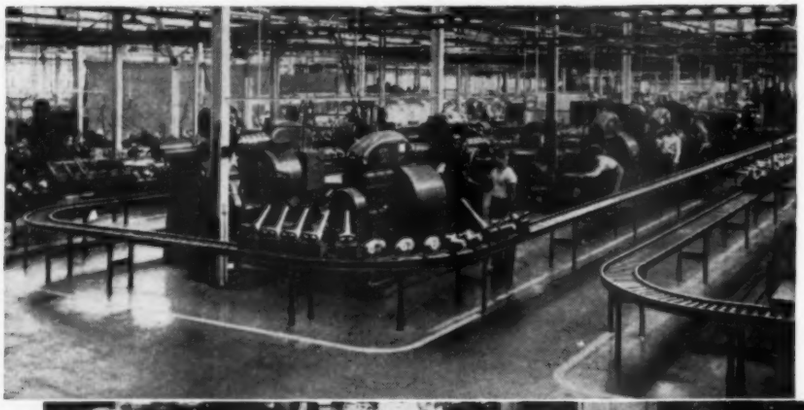
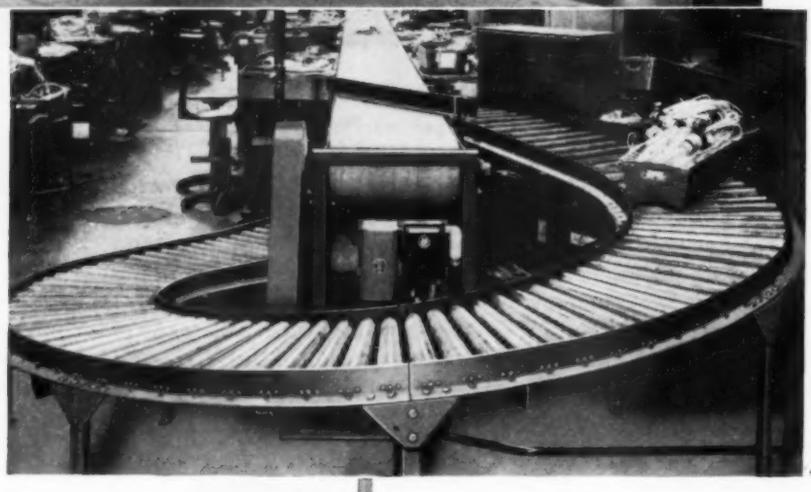
Looking for a way to get material from one part of your plant to another . . . you wouldn't consider the burro as the best answer. The real answer to fast, economical material handling is Standard Conveyors —a system, a section or a portable powered unit. Standard Conveyors are built for almost every material handling need, from mail to malleable iron castings. Look over your shop or warehouse, there's more than an even chance you can save time, money and labor with a Standard Conveyor. Standard Conveyor Company, General Offices: North St. Paul 9, Minn., Sales and Service in Principal Cities.





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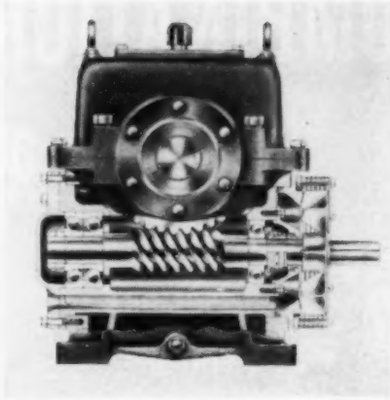
Standard GRAVITY & POWER CONVEYORS



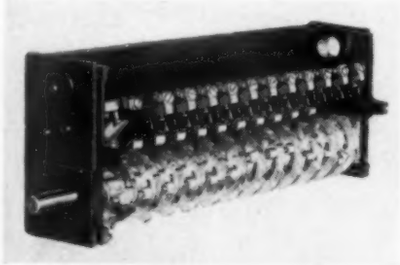
Horizontal and Vertical Worm-Gear Drives Produced by Foote

A line of inclosed worm-gear drives in both horizontal and vertical types has been announced by Foote Bros. Gear Machine Corp., Chicago, Ill. Carbon lapped ring seals are claimed to prevent oil leakage.

Worm-gear drives are available in a wide range of standard ratios, conforming to AGMA and NEMA standards. Increased load-carrying capacity is claimed for the high power units as a result of a new technique in generating gears.

Northwest Alkali Emulsion Cleaner Removes Oils, Drawing Compounds

Northwest Chemical Co., 9310 Roselawn Ave., Detroit 4, Mich., announces an alkali emulsion cleaner for removing oils and tallow-based drawing compounds. The cleaner SC-9 contains a petroluem derivative to control foam and the formation of rust. It is adapted to general washing-machine use prior to bonderizing and painting and as a precleaner prior to plating.



Rotating-Cam Limit Switch Opens, Closes to 12 Circuits

Allen Bradley Co., Milwaukee, Wis., announces a new heavy-duty rotating-cam limit switch. It will open and close up to 12 circuits at any position of the actuating camshaft. Contactors are individually detachable and the shaft and cam assembly

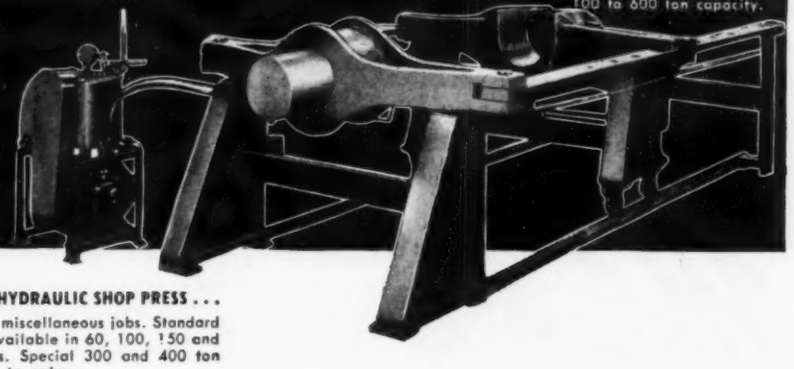
Rodgers PRESSES

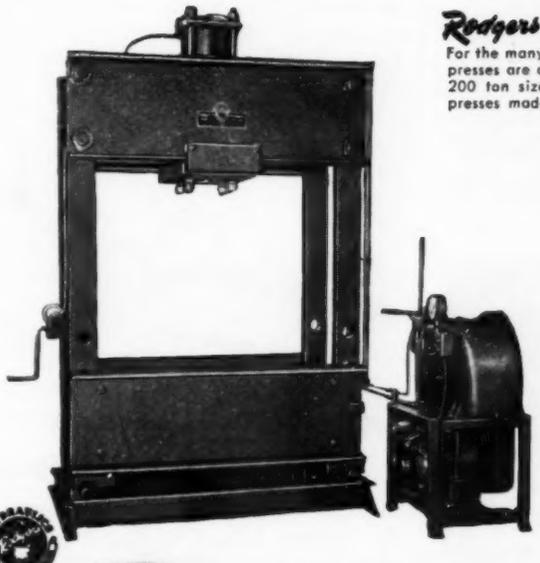
HYDRAULICS
Rodgers
KEEP THE WORLD MOVING

Custom Built . . . yet versatile in use

Rodgers
UTILITY SHIPYARD PRESS AND KEEL BENDER . . .
An outstanding press to solve a particular problem.

Rodgers
300 TON FORCING PRESS . . .
Ideal for wheel, sprocket or gear forcing . . . for 1001 pressing, straightening or bending operations . . . available in 100 to 600 ton capacity.





Rodgers HYDRAULIC SHOP PRESS . . .
For the many miscellaneous jobs. Standard presses are available in 60, 100, 150 and 200 ton sizes. Special 300 and 400 ton presses made to order.

REGARDLESS of the type press you need, you'll find a sturdy, dependable Rodgers press to meet the requirements. For Rodgers has long been a leader in the design and manufacture of outstanding presses for most every use.

For ordinary press requirements, there is a *standard* Rodgers press. If hydraulic equipment is needed to perform unusual production or maintenance jobs, the Rodgers engineering department will offer suggestions on the type equipment to use or design units to perform as desired.

All Rodgers presses are built under expert care and strict supervision. All units are guaranteed to withstand or produce the pressure that they were designed and advertised to perform.

Send for full information.

Rodgers Hydraulic, Inc.

Hydraulic Power Equipment

Shop Presses
Crawler-Track Presses
Portable Presses
Power Pump Units

7407 WALKER ST., ST. LOUIS PARK
MINNEAPOLIS 16, MINN.

McCaskey Tool Control in Typical Chance Vought Crib.

How Chance Vought Aircraft Cut Breakage and Other Tool Costs

The Chance Vought Aircraft Division of United Aircraft Corporation adopted McCaskey Tool Crib Control for three cribs ten years ago. Lower tool costs—cut in a dozen ways—quickly proved its value and the McCaskey controlled cribs have increased to 16 with the growth of the plant.

McCaskey Control has been particularly effective in locating and reducing breakage during periods of both top employment and normal operations. Complete accountability for tools and their transfer from one crib to another on the basis of usage data have kept loss and inventories at a minimum.

New and reclaimed tools, stocked and supplied to all the cribs from the Main Tool Crib, are also controlled by a small staff with McCaskey Inventory Control. McCaskey contributes materially to the unusually efficient organization and economical operation of Chance Vought's Tool Department.

Let us have a qualified representative explain how McCaskey Control will save from the beginning in your plant . . . or send you proof of McCaskey savings in several well-known plants.

McCaskey INDUSTRIAL CONTROLS

PRODUCTION • INVENTORY • TOOLS • COSTS • PAYROLL

THE McCASKEY REGISTER COMPANY, ALLIANCE, OHIO

McCaskey Systems Ltd., Galt, Canada — The McCaskey Register Co., Watford, England

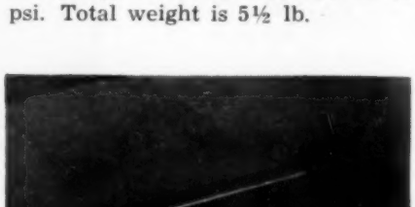
McCaskey Inventory Control in Main Tool Crib.

is removable for adjustment. The switch is available in general-purpose or water-tight inclosures.

Alemite Soluble Oil Mixer Proportions Water and Oils

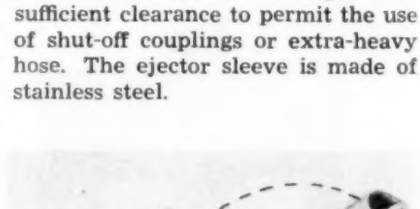
A soluble oil mixer is being produced by Alemite Div., Stewart-Warner Corp., 1826 Diversey Pkway, Chicago 14, Ill. The mixer proportions water and soluble oils and transfers the product into another container.

Water pressure, the only power necessary, must be from 24 to 30 psi. Total weight is 5½ lb.



Water-Cooled Ejector-Type Holder Available for Spot-Welder Tips

A water-cooled ejector-type holder for spot-welder tips is offered by the Resistance Welding Dept., Ampco Metal Inc., Milwaukee 4, Wis. A leakproof replaceable seal of Sirvene rubber is offered. The head is an aluminum-bronze alloy. Water connections are set in an angle with sufficient clearance to permit the use of shut-off couplings or extra-heavy hose. The ejector sleeve is made of stainless steel.



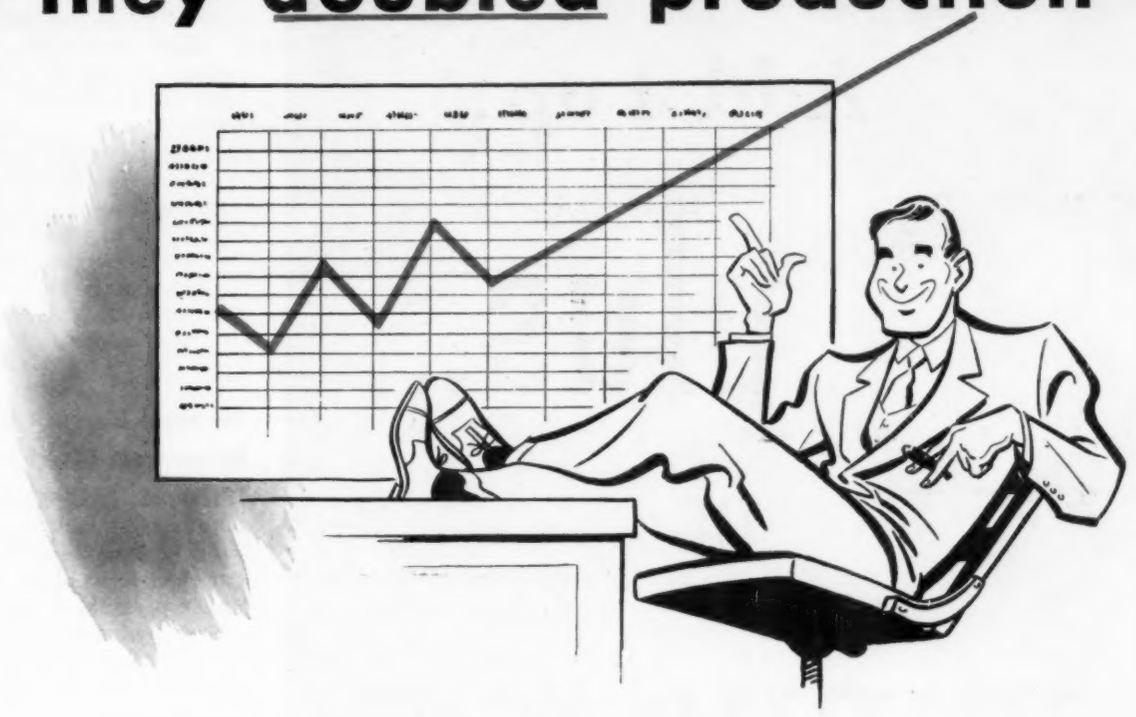
Lapeer Push-Pull Clamp Holds 800 lb. in Hard-to-Reach Spaces

A new type of clamp is announced by Lapeer Mfg. Co., Lapeer, Michigan. It is push-and-pull clamp, Model P&P-800.

It is intended to perform in places where space is limited or under circumstances where the operating handle cannot be accommodated except at some distance from the point of pressure application.

The clamp can exert up to 800 lb. pressure with normal hand operation

And they doubled production—



without adding men, materials or machines:

HOW WOULD you like to see:

Your production of pieces per tool grind upped 300%? Rough grinding operations eliminated? One lathe replace four? Work speeds quadrupled and finishes improved at the same time? More work squeezed from your machines? Troublesome wear problems licked? The parts you make held to extremely close tolerances?

Get these results with Carboloy Tools

In the manufacture of dairy equipment, a simple change to Carboloy Cemented Carbide brought *every one of these advantages.*

As a result, production more than doubled . . . and in spite of nearly a 16% raise in hourly labor rate, and substantial increases in material costs, cost per piece was *not* increased.

How can you get these results?

The benefits of Carbide can apply to your operations, too. And there's one sure way to find out how: *call in a Carboloy engineer.* He has come up against almost every kind of carbide problem, and can bring to your plant his wide knowledge and experience in getting the most from carbides.

His specialized knowledge of carbides, together with the intimate knowledge your engineers have of your particular production problems, will be able to cure many of your production ills . . . even if you're already using carbides to some extent.

Call in your Carboloy engineer

He'll gladly help you—for that's his job. He can assist you, too, in the selection of the most economical tooling from any of Carboloy's 600 standard tools and blanks, or special Carbide-tipped tools made by more than 150 tool manufacturers.

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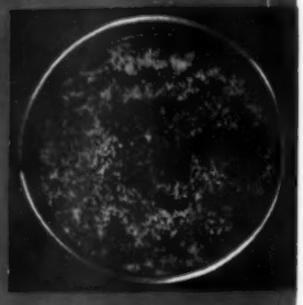

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Dowicides greatly extend the useful life of cutting, grinding, rolling and hydraulic soluble-oil emulsions. And, in keeping emulsions fresh by controlling bacteria and fungi, the Dowicides have proved effective and economical. Available in both oil and water-soluble types, the Dowicides are ideally suited to incorporation with these oils and emulsions.

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in either the push or the pull movement of the handle, which will automatically lock and hold work securely upon completion of the handle swing. It can function as a clamp with the plunger at either extreme, holding parts on milling machine, drilling machine, cut-off saw, etc. or it can be used to exert a continuous pushing or pulling motion, during the entire 1¼-in travel of the plunger.

The plunger is supplied with both an external ⅜-24 thread and an internal ¼-28 thread to give user choice of adaptation.

Durakool Mercury Switch Models Range from 1- to 65-amp. Capacity

Durakool Inc., Elkhart, Ind., announces mercury-switch models ranging from 1- to 65-amp. capacity. An electric weld seals hydrogen gas under pressure in the metal case.

The hydrogen gas is claimed to kill the usual arc between the mercury and the contact points of the switch. There is only one electrode inside the switch, since the case acts as an electrode.

GE Pyranol Motor-Capacitor Available in Popular Ratings

A Pyranol motor capacitor is offered by the Transformer and Allied Products Div. of the General Electric Co., Schenectady 5, N. Y. It is available in all popular ratings and is inclosed in 10-gage steel tubings. Bushings are of silicone which is impervious to oils, acids, and alkalies. The steel mounting bracket is spot welded to the capacitor inclosure.

Kelite Products Paint Remover Contains No Phenolic Compounds

Kelite Products, Inc., Box 2917, Terminal Annex, Los Angeles 54, Calif., has introduced a new paint remover. The material penetrates paint by inhibiting evaporation. It is effective

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DETROIT, MICH.—Bentley & Hyde
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MILWAUKIE, WIS.—Hyster Company
MINNEAPOLIS, MINN.—W. S. Nott Company
MOBILE, ALA.—S & T Equipment Co., Inc.
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NEW ORLEANS, LA.—Hyster Company of Louisiana, Inc.
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OTTAWA, ONT.—A. R. Williams Machy. Co., Ltd.
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PHOENIX, ARIZ.—Equipment Sales Company
PITTSBURGH, PA.—Equipco Sales Company
PORTLAND, ORE.—Hyster Sales Company
RICHMOND, VA.—Richmond Auto Parts, Inc.
ROCHESTER, N. Y.
Rapids Handling Equipment Co. of Buffalo, Inc.
ST. JOHNS, N. F.—City Service Company, Ltd.
ST. LOUIS, MO.—Wharton L. Peters, Inc.
SALT LAKE CITY, UTAH—Arnold Machinery Company
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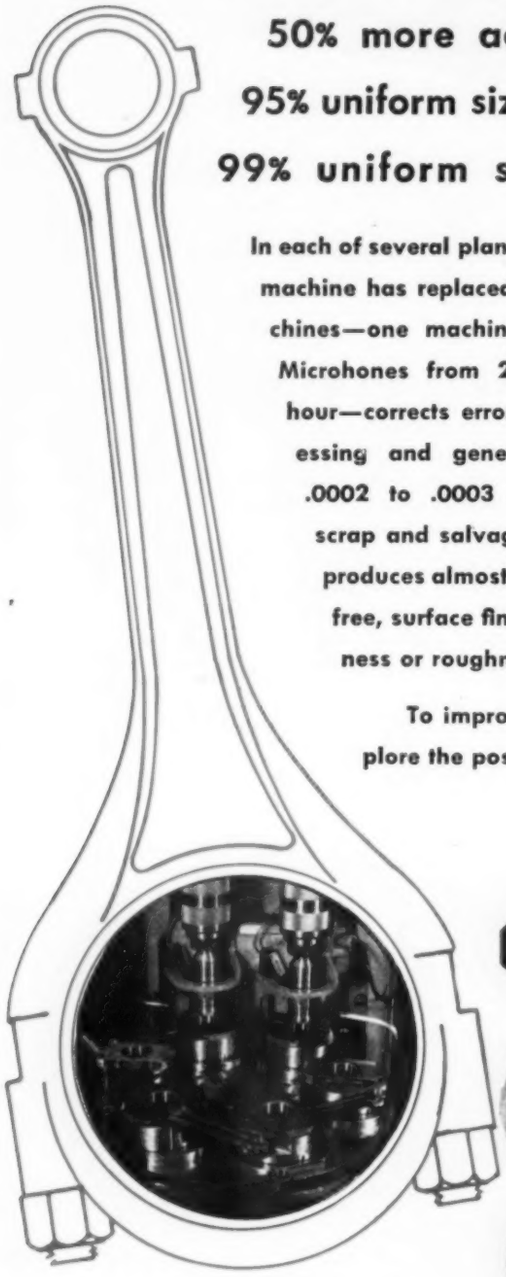
microhoned*

for: 20% to 40% more production

50% more accurate bearings

95% uniform size, fewer re-runs

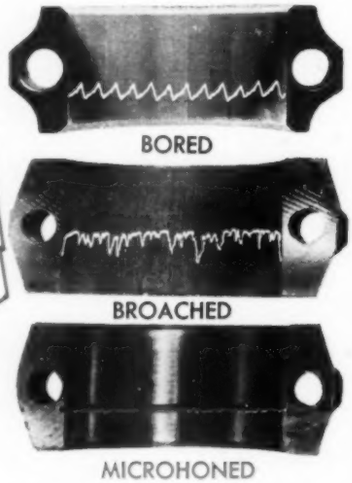
99% uniform surface finish



In each of several plants, one microhoning machine has replaced three grinding machines—one machine and one operator. Microhones from 250 to 400 rods per hour—corrects errors from previous processing and generates accuracy within .0002 to .0003 inch—reduces oversize scrap and salvage re-runs to within 5%—produces almost perfectly uniform, chatter-free, surface finish of any desired smoothness or roughness.

To improve your production, let's explore the possibilities now.

Six-station fixture for Microhoning two connecting rods simultaneously.



Comparison of Profilograph records of typical connecting rod machining operations.

* TRADEMARK REG. U. S. PAT. OFF.

MICROMATIC HONE CORPORATION

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616 Empire Bldg., 206 S. Main St., Rockford, Ill.
55 George St., Brantford, Ont., Canada
Micromold Manufacturing Div., Boston Post Road, Guilford, Conn.

for outdoor use because of its slow-drying quality.

Called Kelite paint lift, the material is claimed safe for all metals and contains no phenolic compounds. It is also claimed non-toxic, non-corrosive and nonflammable.

AIR-CONVERSION UNIT is offered by Paragon Metal Products, 844 W. Adams St., Chicago 7, Ill. The air-conversion unit is designed for converting hand-operated arbor presses into air presses. By removing the ram-retainer plate and ram from the old press, it is possible to convert it into a ready-to-operate air press. The air unit is placed into the ram seat, the plate is replaced and the unit is connected to the shop air line. The air conversion unit has a 4-in. I.D. cylinder, a 2½-in. stroke, a ¾-in. ram, and a power factor 12½ times that of the line pressure

Ward Leonard Magnetic Starter Features High Arc Interruption

Ward Leonard Electric Co., Mount Vernon, N. Y., announces development of new, non-reversing magnetic starters. They are designed under NEMA and Underwriters' Laboratories, Inc. standards.

The compact starters have a max. inclosed rating of 7½ hp., 440-550 volts, 3-phase, 60 cycles. Standard operating coils are available for 110-,

Can you use this extra man on your staff?

The Boston Gear Distributor in your vicinity is ready to perform all the functions of an expediter for you . . . and then some! He stocks the famous Boston Gear line of mechanical drive components: Gears . . . Sprockets . . . Speed Reducers . . . Ratiomotors . . . Reductors . . . Pillow Blocks . . . Bearings . . . Couplings . . . Pulleys, etc.— and he's ready to give you prompt, helpful service. Why not get acquainted with your nearest Boston Gear Distributor . . . he's a valuable man to know!

Look over this list . . . there's a Boston Gear Distributor within fast shipping time of your plant:

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J. M. Tull Metal & Sup. Co., Inc., 285 Marietta St.
BALTIMORE, MARYLAND
Carey Machinery & Sup. Co., 119-21 E. Lombard St.
BOSTON, MASSACHUSETTS
Chandler & Farquhar Co., Inc., 900 Commonwealth Ave.
BRIDGEPORT, CONNECTICUT
The Hawley Hardware Co., 1120 Main St.
BROOKLYN, NEW YORK
H. L. Dickie, 314 36th St.
BUFFALO, NEW YORK
Root, Neal & Co., 64 Peabody St.
CANTON, OHIO
Mfrs. Rubber & Sup. Co., 707-11 12th St., N. E.
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Matthews-Morse Sales Co., 909 So. Mint St.
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Standard Bearings Co., 1014 Grand Ave.
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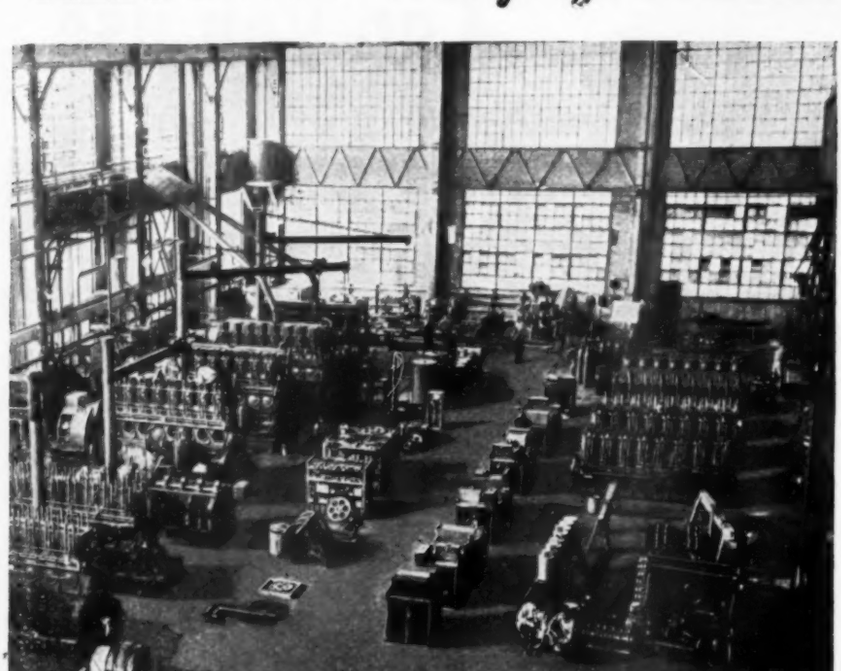

General View of Diesel Engine Test Shop, Baldwin Locomotive Works, Philadelphia, Pa.

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This, a great Diesel Engine plant, is one of many of America's vital industries where KEX Industrial Wiping Towels contribute to greater efficiency of operation.

The reason why KEX Industrial Wiping Towels have won for themselves such an important role is because they have been produced *for wiping only*. They have no harsh seams... no hidden buttons... no abrasive particles to mar delicate and expensive surfaces.

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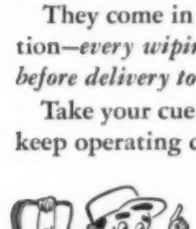
Take your cue from industrial leaders who make it their business to keep operating costs down—and efficiency up.



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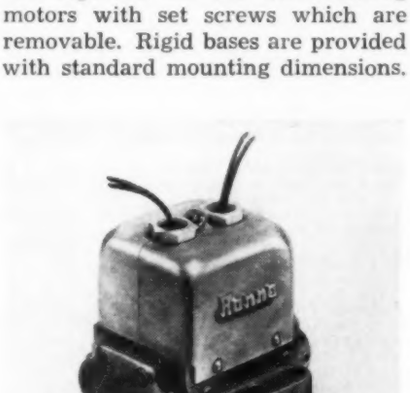
208-220-, 440- and 550-volts, 25-, 50-, or 60-cycle service. Dual-voltage controls can be supplied for 110/220 or 220/440-volt, 60 cycles.

Kingston-Conley Electric Motors Feature Shock-Resistant Mountings

Kingston Conley Div., Hoover Co., North Plainfield, N. J., announces rubber-mounted motors for heavy-duty service. They are manufactured in ratings up to ½ hp. 1725 and 3450 rpm.

Either sleeve or ball-bearings are available, and the motors are made in both single-phase and polyphase types.

Oil cups on sleeve bearing motors are replaced on the ball bearing motors with set screws which are removable. Rigid bases are provided with standard mounting dimensions.



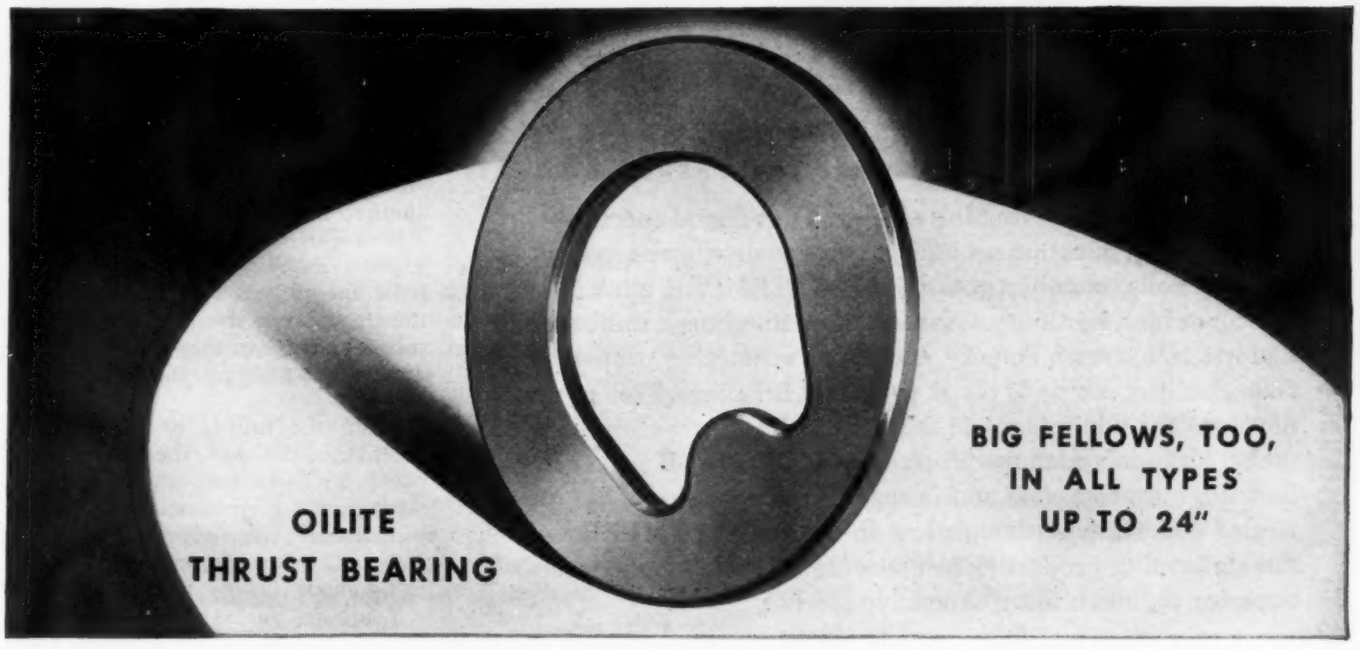
Hanna Solenoid Valve Responds In 1/20 Sec. for 4-Way Control

Hanna Engineering Corp., Chicago, Ill., announces a four-way solenoid valve of the balanced-spool type controlled by a built-in solenoid pilot valve. Lines may be connected to bottom, sides or a combination of both as desired.

Solenoids may be removed and replaced without severing wiring connections if a cord with pin plugs is employed. The spool-and-sleeve assembly can also be removed without moving the valve out of position.

OILITE

OIL CUSHION — HEAVY DUTY BEARINGS



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OILITE operates under the principles of hydraulics.
OILITE is a precision product and permits lower bearing clearances.

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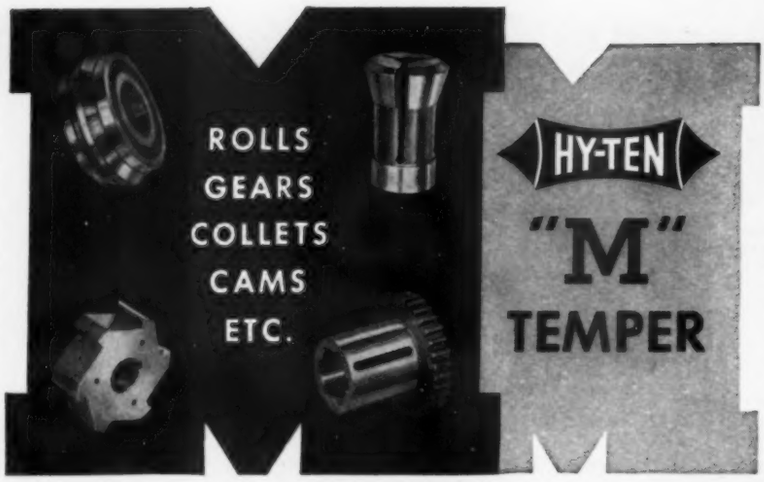

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"M" TEMPER oil hardening steel was developed specifically for such vital, punishment-taking parts as dies, cams, collets, forming rolls, clutches, gears, etc. "M" TEMPER effectively combines high hardness with maximum toughness, minimum distortion, extreme density and great strength – properties that ideally combine to resist wear and breakage. This grade develops the advantages of the powerful alloys – chromium, nickel and molybdenum. Moreover, "M" TEMPER has excellent forging properties and is readily machinable in the annealed condition. Although low in cost, "M" TEMPER has non-deforming properties comparable to, and in many cases superior to, much more expensive steels.

WL *steels are metallurgically constant. This guarantees uniformity of chemistry, grain size, hardenability—thus eliminating costly changes in heat treating specifications.*

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HY-TEN and AISI

ROUND TABLE *Discussion*

RATING OR RATTING?

Merit rating, when applied with understanding, can serve as a guide to the employee's growth within the company.

The unfortunate thing about rating is that one can become prejudiced and thus throw the rating out of line. This might be considered ratting because it usually results in disaster for the employee being rated. One checkmate that can be applied is that both foreman and supervisor be required to rate each man on the same sheet. This, in effect, keeps the rating on a more even keel—for two men never quite see eye to eye on another employee.

It is quite true, as Ed states, that a great many people don't like to have themselves rated. Frequently this is because they consider themselves better than they really are and don't want to learn their shortcomings.

Often the failing of merit-rating procedures is that the man being rated is never told about what is wrong. He may resent being told, but if properly approached, most men will listen. Some will do something about it.

There are varied rating forms, but a style that appears to function very well provides spaces for rating a man from 1 to 15 (five groups: outstanding, good, average, below average, poor) on each of 11 qualities:

Ability to do assigned work
Quality of work
Speed—accuracy
Attitude toward work
Ability to learn
Initiative and ambition
Reliability
Teamwork
Conduct
Leadership ability
Personal habits (Includes attendance)

The foreman and the supervisor are requested to make additional comments regarding the worker's qualifications which may not be fully told on the rating sheet. Men who have used this sheet have found it to be quite helpful in assisting them later in reviewing the worker's ability to hold another and frequently better job.

Supervisors and foremen are requested not to check previous sheets before rating the employee. However, they are urged to make a com-

HYDROLECTRIC LIFT TRUCK

HYDROLECTRIC LIFT TRUCK

Battery Electric Trucks and EXIDE-IRONCLAD® BATTERIES

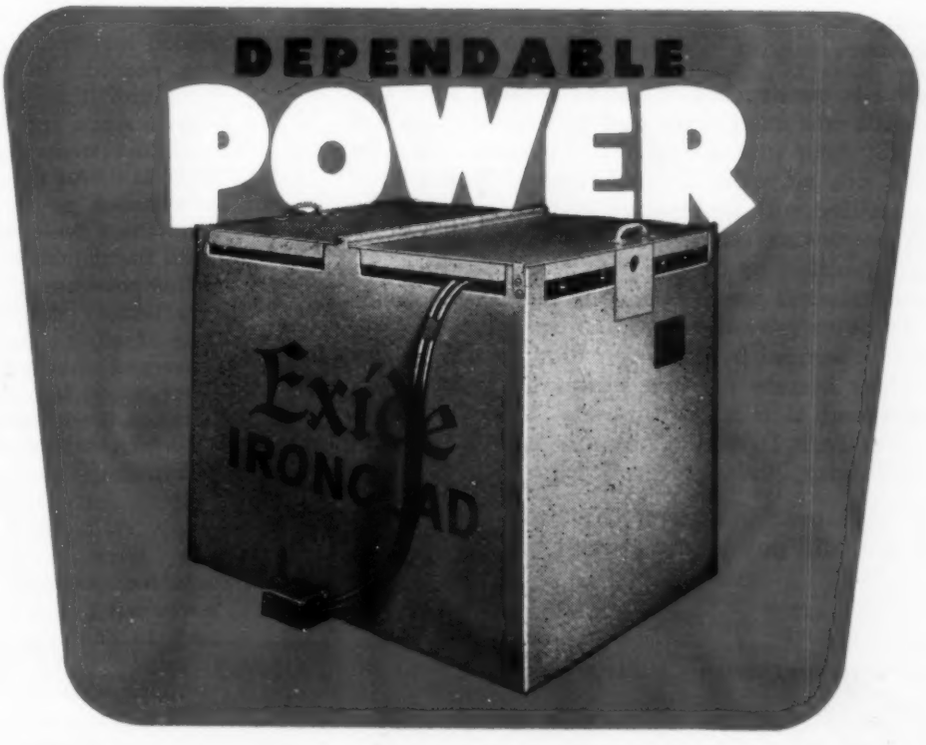
Help to lower production costs . . .

Mechanized materials handling, with battery electric trucks, is one solution to high production costs. By this modern, efficient method materials are moved in greater volume, and at a big saving of time, effort and handling costs.

America's top industries prefer battery electric trucks because, when *all* costs are added up, they show the *lowest cost per ton handled*. And you can count on maximum safety and dependability, with full shift availability, when the motive power is supplied by Exide-Ironclad Batteries.

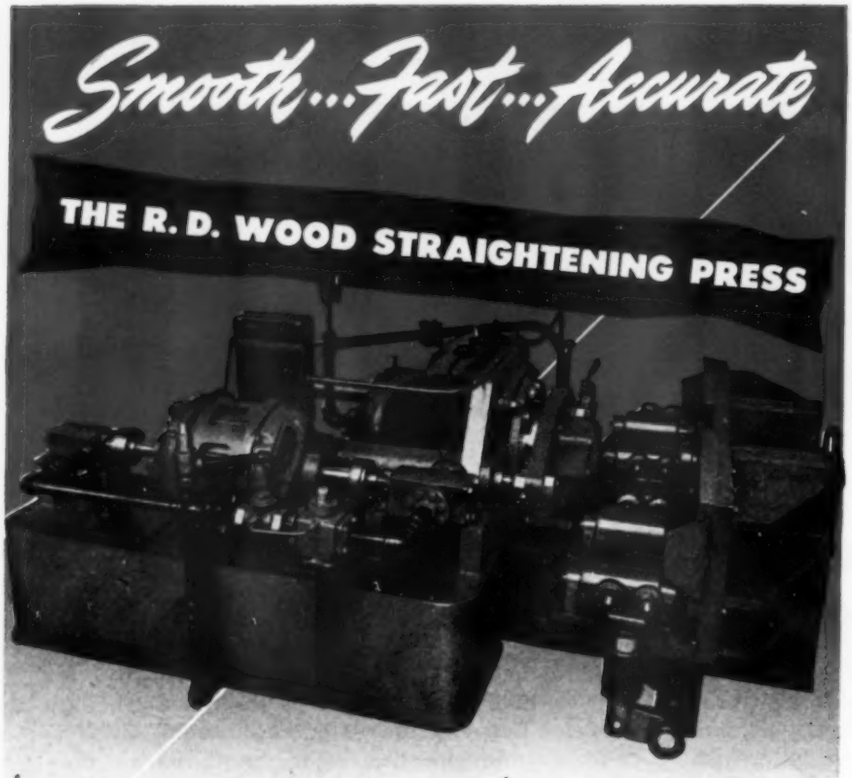
Electric industrial truck users have frequently expressed a preference for Exide-Ironclad Batteries, the batteries that assure peak performance day after day. This preference is due to the fact that Exide-Ironclad Batteries have ALL FOUR of the vital characteristics of a storage battery—high power ability, high electrical efficiency, ruggedness and long life.

Write for further particulars and FREE copy of Exide-Ironclad Topics, which covers latest developments in materials handling and shows actual case histories.



1888 . . . Dependable Batteries for 60 Years . . . 1948

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia 32 • *Exide Batteries of Canada, Limited, Toronto*



For STRAIGHTENING { SHAFTING, AXLES, ROUND BARS, RODS

The modern design and quality construction of this 200-ton R. D. Wood Shaft Straightening Press are your guarantee of smooth, fast, accurate handling of work . . . *plus* increased production.

The press frame is constructed of heavy welded steel and carries individual cast steel main and pull-back cylinders. Press table is 73" long with a gap of 13" between dies. Resistance blocks are movable on the vertical frame face. The table is provided with four heavy stationary rollers for shifting shafts lengthwise, as well as four sets of lifting and turning rollers operated by an air cylinder. An adjustable stop, which will take full press load, is located in the center of the press frame to prevent over-bending. High and low pressure pumps, operated by a 20-hp motor, provide a ram speed of 72" per minute for low pressure closing. High pressure ram speed is 8.5" per minute. Send today for descriptive literature. R. D. Wood Company, Ledger Building, Independence Square, Philadelphia 5, Pa.

When faced with problems involving hydraulic presses and equipment, it will pay you to consult with R. D. Wood engineers.

HYDRAULIC PRESSES AND VALVES FOR [illegible] • ACCUMULATORS • REGULATORS • INTENSIFIERS

R. D. Wood Company

parison after they have filled out the rating sheet. This plan is used to rate an hourly worker every 4 mo. and an office employee every 6 mo.

Hence, while rating can become ratting, an efficient merit system keeps a company growing and aware of the potentialities of its employees.

Charles D. Townsend
Centralia, Mo.

•

SWAPPING SHOPS

A modified version of this idea is beginning to find favor in Britain, but it is confined to interworks exchange (between different works or plants in one company). The more ambitious plan of exchanging employees with competing firms has not, to my knowledge, been attempted here.

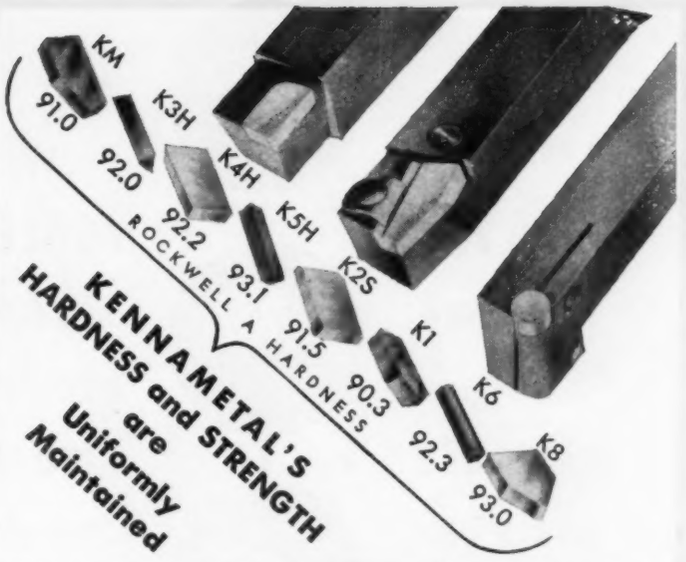
The experiment stems from the shortsighted policy of industrialists and government alike during the uneasy truce between wars. During the trade slump in Britain from about 1925 until 1936, large numbers of skilled journeyman machinists, out of work, became bus and tramcar drivers. Many were attracted to the tram lines because they were controlled by municipal authorities; pay was certain and in most cases retiring pension schemes were in operation.

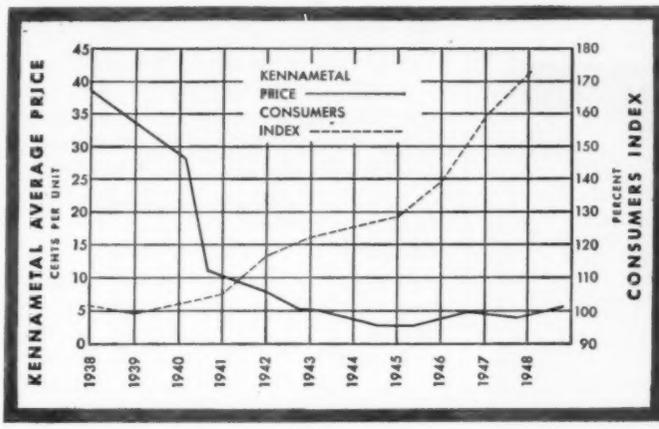
When war came in 1939, this large body of men could not be induced to return to the shops under the prevailing wages and conditions. The result was that production of war-needed materials fell short of what was needed. In addition, parents were unwilling to encourage their sons to serve apprenticeships at the machinist trade during those lean years as it was then regarded by the uninformed as a dying industry. Thus there were no trained youths to fill the industrial gaps.

The government of the day was considerably shaken by the serious state of affairs and intimated to all concerned that such a thing must never again be allowed to happen. Between the government and industry a plan was devised to make apprenticeships more attractive in pay, training and working conditions generally. As a result, large companies now have comprehensive, well-balanced training courses. The interchanging idea plays an important part in the practical side of the training.

Apprentices spend six months in a central shop, learning fundamentals, and then are sent to another of the organization's shops. They move around, returning to the "home" shop for basic training between

The Best CUTTING TOOL is consistent in Performance Value





The Best "MONEY TOOL" is consistent in Purchasing Value

Kennametal costs much less today than when introduced, 10 years ago, yet its value as a cutting tool material is superior.

Money is far "cheaper" today, the supply more plentiful—its purchasing power has been greatly depreciated.

Kennametal's distinctive processing, scientifically controlled, produces cemented carbide compositions that are uniformly hard and strong—consistently sound. Their "promised" qualities are readily convertible into outstanding, dependable performance wherever and whenever used.

Unfortunately the production savings effected by the use of Kennametal tools are earnable only in the "coin of the realm", which now is fiat money, of fluctuating value.

Tampering with the "processing" of our money tool has brought economic confusion, uncertainty, and insecurity. The savings of individuals have been jeopardized, the plans of business enterprises thwarted, and the very freedom of American citizens threatened.

Honest measures of weight, volume, and distance—a ton of coal, a quart of milk, a yard of cloth—are rigidly maintained Government Standards. Corresponding honesty in the measure of money value is even more vital to economic welfare.

An honest dollar lets an individual know with assurance the worth of his earnings and the reserves he has set aside for savings, insurance, and pensions. An honest dollar enables a business man to make firm, fair contracts, meet current and future obligations with certainty, and engage in creative ventures.

The most trustworthy money system ever devised is the convertible Gold Standard. If this were restored, as now proposed in a bill before Congress*, we could again have confidence in our currency as an efficient medium of daily exchange, a reliable measure of worth for today and value for tomorrow.

Kennametal Inc. has rigidly adhered to the practice of maintaining full value in every gram of its product. Although you still have to buy Kennametal with uncertain dollars, there is no uncertainty about the Kennametal you get. Just as there are different denominations of currency, so there are different "grades" of Kennametal, each having its specific "cash" value convertible into dependable service. From our Catalog 48 you can order Kennametal products with assurance.

* **Bill H. R. 5031** introduced into the House of Representatives, January 20, 1948, by Congressman Buffet of Nebraska cited as the "Gold Standard Act of 1948."

A BILL

"To restore the right of American citizens to freely own gold and gold coins; to return control over the public purse to the people; to restrain further deterioration of our currency; to enable holders of paper money to redeem it in gold coin on demand; to establish and maintain a domestic gold coin standard; and for other purposes."

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now **MARK** metal or plastic parts

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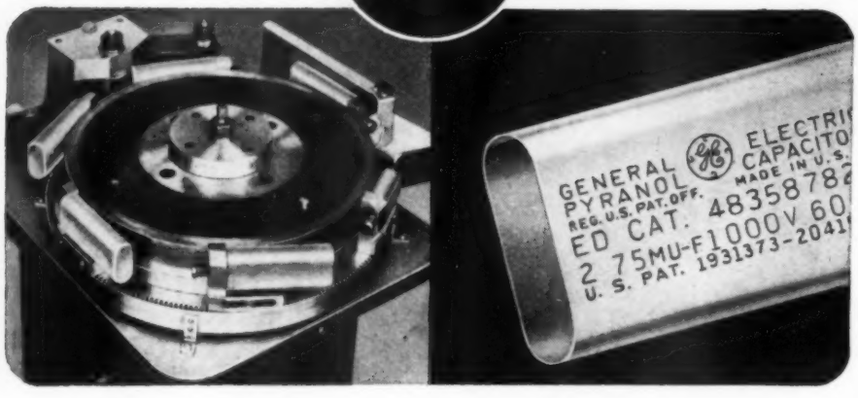

Are you using modern methods and equipment for marking the products you manufacture? Right now Noblewest Rapid Production Marking Machines are stepping up production and saving money for leading manufacturers in many industries. For example, Model No. 286, shown above is tooled for marking GE capacitors. The inscription, shown at right, being permanently *rolled in,* lasts as long as the product itself. Noblewest equipment can be used for marking metal, plastic, hard rubber, etc. Marking speeds are practically unlimited. Every Noblewest Marking Machine is engineered to meet your specific requirements, and backed by the skill, experience and facilities of the world's leading manufacturer or rapid production marking equipment. Whatever your marking problem, Noblewest engineers will be glad to make time and money saving recommendations without obligation to you. A copy of our new catalog on Modern Marking Methods will be sent upon request. Write to Noble & Westbrook Manufacturing Company, 17 Westbrook Street, East Hartford 8, Conn.

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EQUIPMENT FOR MARKING · GRADUATING · EMBOSSING · NUMBERING

tours. After five years, training is complete.

Much the same scheme is followed with staff or key men, although they do not move around between companies. This plan has resulted in many improvements in manufacturing methods. The plan is that the best methods of each plant will be adopted for the company as a whole.

C. D. Mackinnon
Airdrie, Scotland

•

WHO HIRES THE BOSS?

This question is part of a greater question that is increasing in importance daily. It is not only who hires the boss, but who fires the boss, who selects management personnel and who, eventually, manages the industry that is the greater question.

The right to select embodies the right to condemn. Any interests that would be allowed to condemn a boss, regardless of his experience, intelligence and general ability, but based upon his personal appeal to the workers, would almost surely disrupt the whole organization.

Although selection of shop foremen by higher management does not always result in perfect harmony, the situation might be much worse if workers who have only a dim view of the over-all supervisory picture could select their bosses. In addition, if this came about, the bosses would no longer be bosses, but would be controlled by the group.

Aesop, in one of his fables, told of the camel that besought his master to allow his head inside the tent during a cold night. The man allowed this slight concession, and a few more, and finally was shoved out the other side of the tent as the camel came all the way in.

P. E. James
Lincoln, England

•

BACK UP OR BACK OUT?

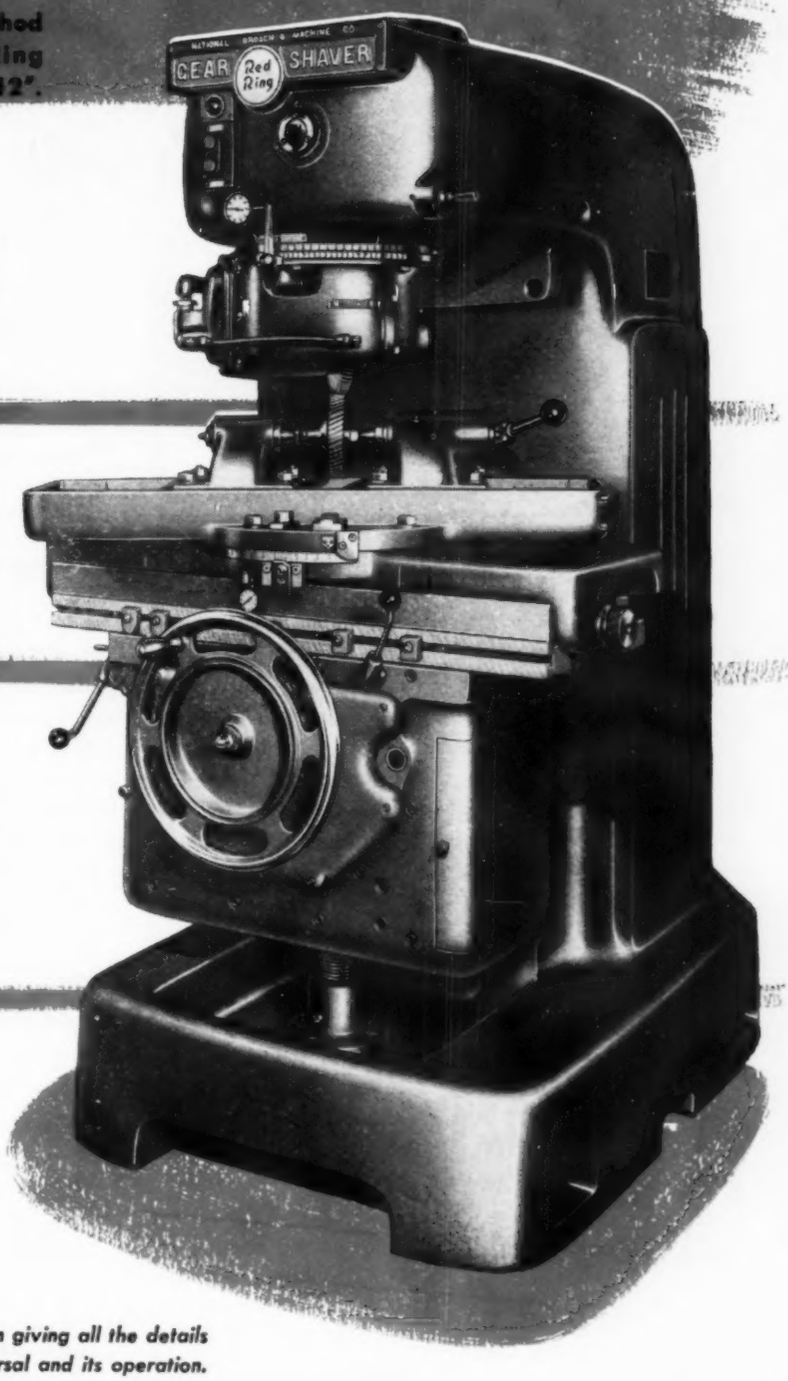
Is it not possible almost to formalize the position? The more complete and efficient the organization of the production dept.—the fixing and recording of methods of manufacture, the provision of special tools and gages, the control of progress, and intermediate inspection—the less necessary to back up. There should be no loose threads.

Alternatively, the less complete the organization, the greater the shop responsibility for planning methods; the provision of special items, tools, etc., and progress of work. The more these are carried by the Al's, the more necessary will it be to back up,

NEW GEAR SHAVING MACHINE

Has far greater production possibilities

Gears may be shaved by any method you choose on the new Red Ring Universal Model GCV-8" and 12".



conventional shaving

You can shave wide face gears by the conventional method of shaving, that is, when the gear is reciprocated across the cutter and parallel to its axis.

diagonal shaving

Or, you can shave the narrower face gears diagonally at much higher production rates and with considerably less cutter wear and less effort by the operator.

elliptoid tooth form

You can give the gear teeth the perfect Elliptoid form (crowning by rocking the table) while they are being shaved by either method mentioned above and without the necessity of using specially formed cutters. Special cutters may be used, however, if desired.

taper shaving

Likewise, gears may be taper-shaved by either the conventional or the diagonal method. This new machine is faster in operation and easier to load and unload than any of its predecessors.

Write for descriptive bulletin giving all the details of the new Red Ring Universal and its operation.

5003

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

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DON'T GIVE ME THAT! THERE AIN'T ANYTHING AS GOOD AS SOL-SPEEDI-DRI! AND I'D PAY A QUARTER OF A CENT A POUND MORE ANY DAY TO BE SURE I'M GETTING MY MONEY'S WORTH! DON'T COME IN HERE AGAIN WITH THAT "JUST AS GOOD" STUFF! WE'RE STICKING TO SOL-SPEEDI-DRI!
STILL AN OLD MAIN STREET BOY -- STILL BELIEVES IN GETTING THE BEST FOR THE JOB -- NOW YOU SEE WHY HE'S THE BOSS!
TELLIN' 'EM OFF
J R WILLIAMS
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People who use SOL-SPEEDI-DRI—industry's original and foremost absorbent for all liquids—have learned that they can count on the uniformly high quality of SOL-SPEEDI-DRI. They have learned, too, that SOL-SPEEDI-DRI costs *less* because it does *more* work . . . because it is always efficient, always dependable.

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WHEN YOU BUY, BE *SURE* IT'S SOL-SPEEDI-DRI!

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and in direct proportion to the absence of these services.

Failure to back up, in these circumstances, would be to court disaster. Surely the responsibility to to take the necessary steps is the firm's, however selflessly the Al's may be prepared to act.

J. E. Powell
Lincoln, England

•

IS BLUE MONDAY INEVITABLE?

I'm afraid that it is. But I do not believe the extra hour leeway is a cure. After the novelty of starting one hour early had worn off, employees would be back rehashing weekend happenings. It's only human nature.

Then. too, what about the worker who doesn't discuss his weekends and never seems to have a "Blue Monday"? Is he to lose an hour's pay along with the other workers?

In comparison with conditions of 30 years ago, work, today, is a picnic. We working people have more privileges, better conditions and shorter hours. There comes a time to call a halt in these advantages if work is to be done at all.

Arthur Silvester
Niantic, Conn.

•

SINGLE-TRACK OR DOUBLE-TRACK MIND?

There are many times at the toolroom window when the attendant cannot spend time to look returned tools over closely enough to be reasonably sure that they are being returned in good condition, not only in regard to injury or slight breakage but for wear and dullness as well.

An arrangement could be made to take care of the situation with the minimum amount of delay by having the stock of checks kept on a board within reach of the receiving and delivery window.

As a tool is returned to the crib, a check from this stock board can be handed to the workman and the tool placed on a portable table having a top surface and shelves below, in which tools could be placed in the order in which they were received.

Whenever there is a lull in duties at the window, the crib attendant could inspect returned tools, making note of any that were damaged or in need of regrinding and readjustment for size, placing them on another portable table to be sent to the proper place for repairs, and while doing this noting the nature of damaged tools that have become so from faulty handling by the workman.

Such procedure should not take

ACTUAL PERFORMANCE TEST PROVES THERE IS NO SUBSTITUTE FOR V-R CARBIDES

DETAILED REPORT:

MACHINE: OPERATION:	14½" South Bend Lathe. Boring Fusion Cup for Calorimeter; Bore face, bottom and outside rim.
MATERIAL:	99% Nickel.
TOOLS:	¾" Diameter by 8" Long V-R Carbide Tipped Boring Tool.

COMPARATIVE PERFORMANCE.

	V-R Carbide Grade EH	Other Carbides
S. F. M.:	225	140
F. R. REV.:	.002	.002
DEPTH OF CUT:	.020	.020
PCS. PER GRIND:	20	2 to 6
REMARKS:	V-R Carbide Tipped Tools eliminated off-tolerance rejections and produced outstanding increases in pieces per grind. Quality of finish resulted in reducing polishing time from 40 minutes to 15 minutes.	

In this and in thousands of other actual machining operations V-R Carbide tools have proven their superiority in eliminating off-tolerance rejections and producing outstanding increases in pieces per grind.

Vascoloy-Ramet carbide tools and blanks are offered in an almost unlimited choice of styles, grades and dimensions to meet any industrial requirement.

CALL your nearest V-R Branch Office today for an effective and economical solution to your production problems.

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is a real Post-War blade!
Yes . . . today's REZISTOR is a post-war development . . . made from a modern high speed steel known as M-2. Newly perfected heat treatment has made possible new high cutting records.
30% GREATER ENDURANCE
The REZISTOR of 1940 was a splendid blade . . . but . . . the REZISTOR of 1948 will show far greater endurance, make more straight cuts per blade, and cut faster. Large quantities of blades, tested in our own laboratories, and on several makes of hack saw machines tell us this is true. They are our proving grounds. Your own machines are yours.
28% MORE STRAIGHT CUTS
The proof . . . compare MILFORD REZISTOR with any high speed steel blade you now use.
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Order from your mill supply distributor. He is always ready to serve your needs for all factory and mill supplies, as well as MILFORD hack saw and band saw blades.
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any more time at the window than customary procedure. It would of course require the use of the portable tables and the crib arranged to afford room to move them about and perhaps some increase in the number of checks. But it should effect a saving in maintenance cost as well as producing a more careful use of tools, because damaged tools would be located and responsibility assigned, thus tending to reduce carelessness on the part of the workmen.

This careful checkup also insures against a tool without a proper cutting edge from being used by a careless workman.

Abel Blakeman,
Watervliet, N. Y.

•

The importance of an efficiently functioning toolroom in the modern plant makes it imperative that dependence be placed on methods of toolroom operation that obviate the necessity of relying to too great an extent on the human element. In other words, emphasis should not be placed on whether a toolroom employee has a single-track or double-track mind. The issue and receipt of tools should be a separate operation from checking them for future serviceability.

Fixing responsibility for returned damaged tools can be accomplished by means of the "double-check" system described in the following paragraphs.

Tools returned by workmen must be checked for necessary repair and further serviceability. Adequate inspection and prompt repair or regrinding of tools will always insure that tools issued to the shop will be entirely up to the standard set and will eliminate the possibility of those losses which experience has proved incidental to the use of unstandardized tools. An effective toolroom has complete jurisdiction over tools as a means of insuring continuation of set tool standards. Production requires tools always in good repair, and, in the case of cutting tools, ground exact and correct.

Operation of the "double-check" system is:

1. Brass number checks with an identifying number for each worker are given to the worker at beginning of his employment.

2. Each tool has a number stamped on it which corresponds to the number stamped on a brass tool check. Thus every tool has an identifying brass tool check.

3. When the worker is issued a tool he hands to the toolroom employee a brass check bearing his number. The check is hung on a

hook on a board. The tool check bearing the number of the issued tool is also hung on that same hook with the worker's check. This procedure indicates at a glance what tools the worker has issued to him.

4. When the tool is returned, the worker's brass check is returned to him. The tool number check is then transferred from the regular board to an "inspection board" and hung on a hook under the identifying number of that particular worker painted on the board above the hook. After careful inspection of the tool, if it passes inspection, the tool number check is removed from the "inspection board". If the tool is found to be unnecessarily damaged, the tool man by referring to the "inspection board" and comparing the number on the tool with the tool number check hanging on the board under the worker's identifying number, is able to fix responsibility readily for the returned damaged tool. This method will allow sufficient time for a careful check to be made of all returned tools and will help cut down unnecessary damage to issued tools. It will also serve notice to the workers to be considerate of their tools.

Most toolrooms have the regular board used to record the location of issued tools. The additional board having the identifying numbers of the workers painted over the hooks and called an "inspection board" will permit more careful inspection at opportune times, and help cut down unnecessary damage to tools by readily determining the man responsible for the damage.

It is desirable that men who issue tools should keep the records in connection with their other work, in order to fill their time and save the wages of a clerk in the issue room. These men have to know the tools and understand the proper care of them, and this leads to the selection of shop men for the purpose. Such men are very seldom good clerks, and, in fact, seem to have a constitutional aversion to clerical work. Records therefore, have to be simple, and writing must be avoided as much as possible. By means of the "double-check" system of brass tags for workers and tools, the control of issue, receipt, inspection, and accountability for damaged goods will be readily accomplished, mechanically.

Harry Kaufman
Philadelphia, Pa.

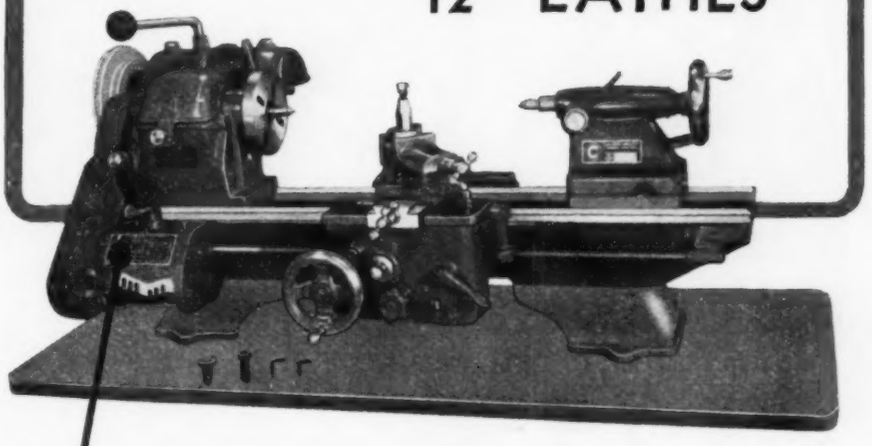
•

DO MORALS AFFECT MORALE?

Some men are secretive in manner; they have little effect on the morale of the shop. However, this type of

Clausing

DUAL QUICK CHANGE
12" LATHES



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chipping and wear on these blades after 8 CUTS — no flywheel used with cutter.
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LOVEJOY FLYWHEELS

These are identical Lovejoy Type "A" Face Milling Cutters tested with identical cuts on the same steel. The picture speaks for itself—it pays to use Lovejoy Flywheels on steel jobs to increase blade life, to get longer runs between grinds, to reduce H. P. requirements, to improve finish, to reduce work spoilage. Write today for Lovejoy Flywheel folder, and ask for detailed engineering help on any of your specific milling problems. There is no obligation.

Lovejoy
TOOL COMPANY, INC.
SPRINGFIELD, VERMONT

"TOOL BITS"

Lovejoy recently announced an unusual negative rake carbide tipped blade, No. 50-18, for cast iron and steel. It has −5° radial rake and 15° axial rake. It can be used in any Lovejoy Type "A" housing ever made. It shears the stock out at terrific speed and gives marvelous work finish, yet requires low H.P. Users are loud in their praise of this new blade. Write for detailed information on this new cost-saver.

man is not great in numbers; most men are either a help or a hindrance to their neighbors in or outside the shop.

Loose morals on the part of one person lower the morale of a group. Humans are prone to follow example, except it be so low that they become disgusted.

It is my belief that most men with whom we associate have some effect on our morals, either to influence us toward better morals or to a carelessness which tends toward a lower standard.

In this day and age, every one can plainly see that the way of the careless brings not only no permanent satisfaction but also loss of respect, friends and material things and is contrary to the best teaching of the day.

Certainly a foreman should be a leader in moral conduct, both in and outside of the shop. No foreman can successfully have favorites in the shop.

John Mark May
Watervliet, N. Y.

•

One day, two young men were standing at a fork in the road of life. "Why don't you get next to yourself, Bud," one man was saying, "Look at the Superintendent. He is showing you the way to be a big man in the business."

The Superintendent was a "big shot"; he drank, and spent a lot of the Company's time and money on wine, women and song. What about the young man who took that fork in the road and imitated the Super? He is broken in health and has not quite so good a job as that he had the day we stood at the fork in the road, and made our separate decisions. But, is that all? No, sad to say. That young man took others with him by citing the powerful example of the big-shot Superintendent—until the Superintendent lost his job and his prestige for his lack of morals.

Did the big-shot Superintendent think he was teaching? No. Did others realize that he was training? No.

One day in 1916, down on the Texas border an Army officer was discussing my job with me. I asked, "What is the big difference between you and an enlisted man?" The kindly old gentleman answered the question by saying, "The difference between you and the enlisted man is just one of responsibility."

Is that not the answer in industry? Is it not true that the main difference between the man on the job and his boss is just one of responsibility? Aside from that one thing, are they

not one and the same? Is it not true that in 99 cases out of 100 that the boss was the man on the job of yesterday? If this is true, then they both are playing under the same rules.

Also, if the difference is only one of responsibility, can the boss do other than set a good example for the men under him? Can he avoid the obligation that he owes to them for their progress and for their success? Can he truthfully say that anything he does is just his own business? That big-shot Superintendent thought he was just living his own life. But he was not living, he was ruining his own life. That is not so bad, but what about the other lives he ruined?

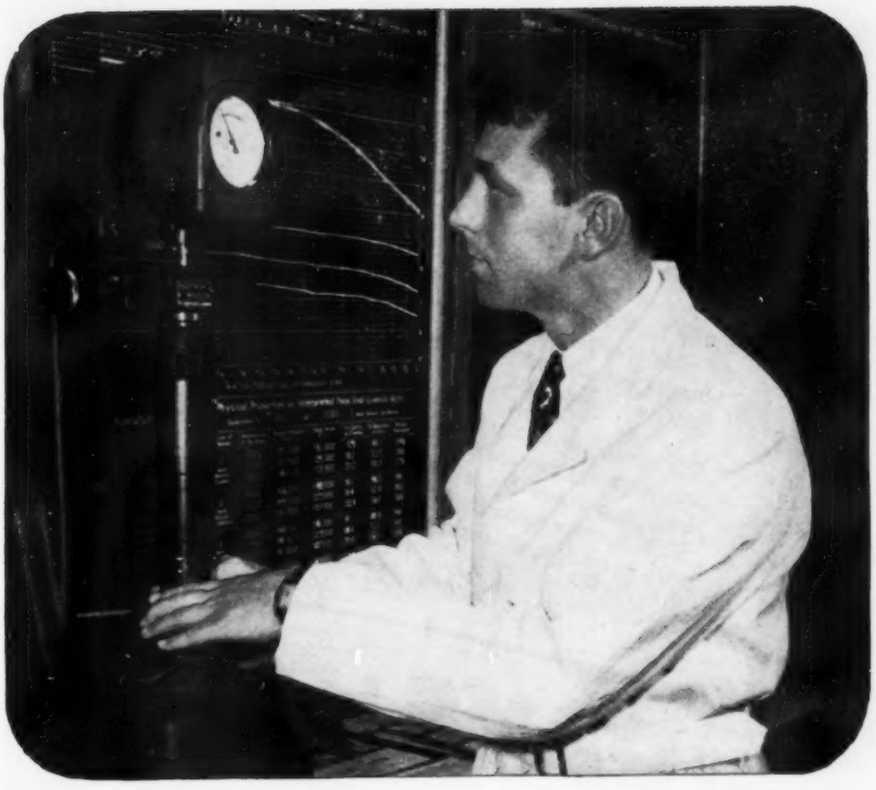
C. H. Weiser
Kansas City, Mo.

•

A person's basic character is not shown by the company he keeps, but by the reason why he keeps such company. In this connection, officials and supervisors of a company have legitimate reasons for keeping their personal relations on a basis above criticism. Their positions demand integrity of character. Analogous to this situation is the fact that a company is known by the men it keeps. A good company will not keep a supervisor who fails to get the best efforts from his men and lacks their cooperation and respect because of his dubious personal relations with some of them.

Human nature being what it is, a man is often judged by his personal inclinations rather than his justification for such inclinations. This is especially true in the case of a supervisor. His personal activities are usually a source of interest to his men, and should be above suspicion and reproach. When such extra-curricular activities and personal inclinations on the part of a foreman include having social contacts with one of his female employees, he can expect comment by his men, although he may feel that the matter does not concern them. Such actions by the foreman eventually lead to a lowering of respect for him on the part of his men, with consequent loss of employee morale.

The supervisor lives in a house of glass, as far as his men are concerned, and he is expected to live an exemplary life. He may feel that what he does outside the plant should be of no concern to the workers. But such sentiment never did stop inquisitiveness and wagging tongues when innocent happenings are misinterpreted or scandal and notoriety



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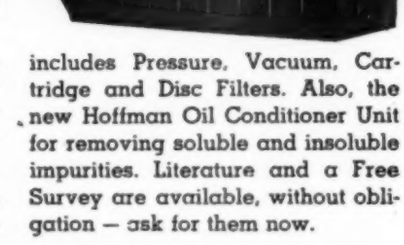

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arises. It is therefore, imperative that the supervisor should give his employees no cause for rumor-mongering in his relationship between himself and his female employees, both inside and outside the plant.

A much misinterpreted truism is the one stating "The best things in life are free." Fun being free, a foreman may feel he is entitled to a little of this freedom once in a while. However, when it comes to his having such freedom with one of his female employees, that's a "horse of another color." A good foreman does not indulge in that kind of freedom, especially on the job. The foreman's business is everybody's business, and his effectiveness as an executive is impaired when he intentionally muddles up personal relationship with his employees by mixing business with pleasure.

Harry Kaufman
Philadelphia, Pa.

•

Al certainly left himself wide open this time. As a foreman he has the privilege of talking to the help, but it certainly was not the intention of higher management to employ a man as foreman who considers himself a wolf or lady-killer.

A supervisor is retained on a staff to carry out the orders and wishes of management as it deals with the business of getting out production. No man or woman is employed to seek personal pleasure during working hours. Certainly Al would yell plenty if his boys working under him took time off from their production jobs to make dates. Why then should it be his privilege to plan his night's pleasure at the expense of the company?

While the foreman does not punch a time clock as his workers do, the company expects him to work while he is on company property. Self respect and the respect of each and every worker must be maintained by the foreman. He cannot play politics or give favors to certain individuals and expect to be able to administer his work effectively. Above all, if his girl friend works in the plant and he wants to make a date, he should make it at noon or before the day's work starts. It is also advisable not to date several different girls, for, just as Al did, the rest of the shop will talk. The foreman will lose face and slowly but surely he will slip and have to be replaced.

One thing that foremen often forget, perhaps because they usually are drawn from the rank and file of workers, is that they must present to the workers the picture of the company. To a worker, the foreman is

the company and its policies. This, of course, holds equally true all the way up the managerial staff. Each supervisor looks to his superior as the "front" of the company. Each man should try to administer his position to the best of his knowledge and ability and set an example to his subordinates.

So while a foreman has the chance to "make" the pretty girls, he is not improving his own position as a company man and will sooner or later be replaced. It is unwise to give the workers a chance to get something on the boss. It is hard enough to supervise workmen under today's conditions if everything is above board.

Chas. D. Townsend
Centralia, Mo.

•

PRESENT OR BRIBE?

The donation of gifts by shop subordinates to superiors on birthdays certainly smacks of bribery to me.

The everlasting collections which characterize some shops are a real source of trouble all around. A collection is usually started by an aggressive extrovert who may be actuated by exhibitionism. Such people fail to appreciate opposite viewpoints.

His powers of persuasion will draw donations from many contacts. Others will reject the idea and a lot of hot air, invective and nervous strain will be expended in the argument. All this takes place during working hours and disrupts production and upsets the more conscientious workers.

The donation of a gift to a person of authority places him in an awkward position. He obviously cannot refuse the gift without making enemies, yet if he accepts he becomes indebted to the givers.

In one plant, collections by two Santa Clauses hit a high point at one Christmas time. Their last project was to round up enough money to present the boss with a case of whiskey, but the boss got wind of it and posted a notice. All donation drives were banned unless he gave his approval. This effectively halted a situation that was going from bad to worse. Not only that; the boss, a martinet who hated favors from anybody, would have been mad for weeks if he had been forced to accept the present.

In this gift-giving business, someone is bound to be offended, and the solution is to simply prohibit such activities on the company premises, or to make a rule of which clearly defined occasions merit collections.

Clifford T. Bower
Decatur, Ga.

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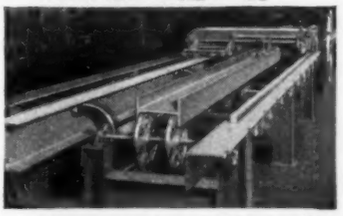

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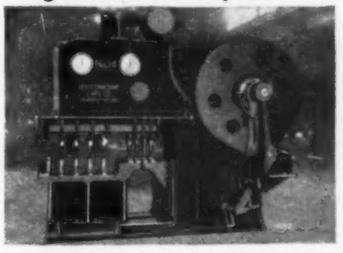

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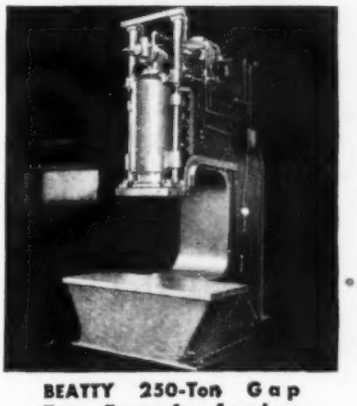

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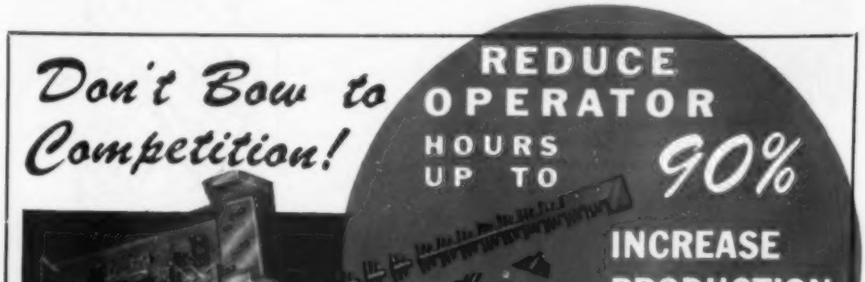

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The gold Masonic ring my men once presented to me, when I was leaving for good, was, I am certain, a gift from the heart of every man in the plant. It has been over 30 years since I received that little-finger decoration and I still cherish the memory.

Was it wrong for the men to express themselves as they did? I couldn't possibly have refused it, could I? I accepted that piece of jewelry in the spirit with which it was given. In my acceptance speech, given to the boys who cluttered up our improvised toolroom, I told them that I knew that they had given me the ring with no strings attached because I was pulling out. The ringleader—there's always a ringleader in this gift game—was one of my best workers whose loyalty was genuine in another shop where we both worked in the same relationship several months later. Whether a disagreeable situation would have resulted, because of the gift, had he taken advantage still remains a question. Fortunately the fellow was a square shooter and knew his place.

Ordinarily a gift to a foreman by the men under him is charged with dynamite unless conditions are perfect. By this I mean that every man involved must be broad-minded and considerate of the rights of others. I may be wrong in my reasoning, but I have an idea that the modern shop presents different situation from the days of long ago.

Then, the foreman and his men would brush elbows over a glass or two (ofttimes to overflowing!) of good, old froth-covered amber delight at five cents a tall glass. The man who feels that he cannot contribute toward a gift is on the spot, in a way—he can't afford unnecessary luxuries and doesn't like to make known his financial predicament yet he would like to chip in with the rest of the fellows. Then we have the man who has the guts to refuse to become a part of such proceedings and doesn't hesitate to express himself. He knows, down in his heart, that such a thing will compromise the foreman. This kind of chap is the Patrick Henry of the shop—stolid and fearless. How does a foreman usually feel knowing that these two individuals didn't contribute toward a gift presented to him? The chances are that the former worker would feel that he'd like to go up to the boss and explain why he didn't chip in while the individualist would continue on with his work, unperturbed. Taking into consideration the many disagreeable angles arising from gift-to-foremen giving, isn't it wise to put such practices down as wrong?

The boss, he looks at his Waltham,
Which Bill Thompson placed on his desk.
He wonders and ponders;
His bewildered mind wanders.
"Is it", he frowns, "for the best?"
A problem confronts that annoys him:
"What have they done to their boss?"
While it's all very well;
I just feel like Hell.
"Somehow I've gained at a loss."

John Homewood
Ontario, Calif.

•

BLUE DEVILS

A goodly number of men can work at the same operation day after day without change, and apparently remain happy and contented. However, there are others who have a nervous temperament that urges them to make a change of environment and activities as well.

I know of one case in which a watch repairer worked steadily on repairing watches for several years, seldom ever losing a day. But when wrist watches became about all that he was called upon to repair, he could work about as usual for about a month, when he became nervous and could make no headway until he had a short period of rest and change of environment. From about three days to a week would bring him back to a normal condition.

If a man apparently makes good use of his time when out of the shop, it would seem best to allow him time off when requested, and not demand a new excuse for his absence each time he asked for it, for if he seriously wants a change, his mind will be on that thought instead of his shop work and his time in the shop is likely to be of but little value to the employer.

John Mark May
Watervliet, N. Y.

•

When a man starts on a job and has everything go wrong, he is likely to become discouraged and feel like going home, but if he sticks to the job he will overcome this feeling and wind up by getting out his work as well as having the personal satisfaction of licking the devil.

The type of work the man is doing and the frequency with which this feeling occurs will determine whether he should "sweat it out" or go home. If mental disturbance overcomes an operator who is performing a hazardous task, he should be permitted or encouraged to take time

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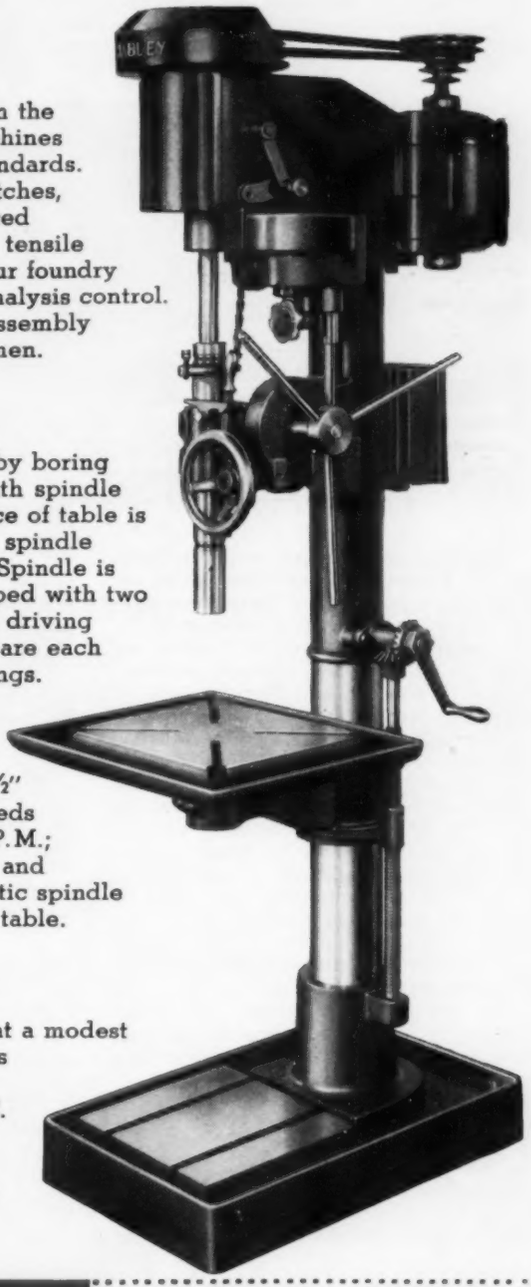

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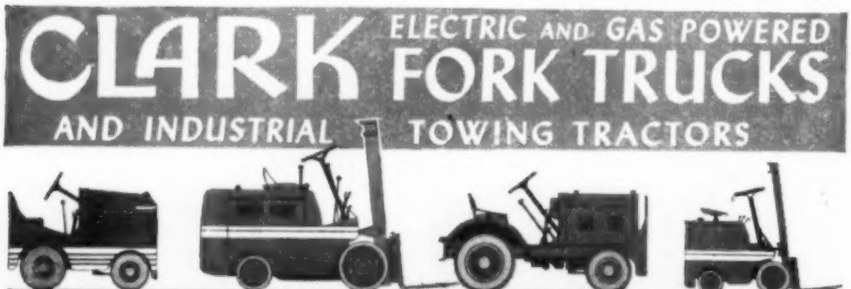

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out. Sometimes another type of job assigned temporarily will give him a chance to gain his bearings.

On Monday mornings a certain percentage of workers are "all thumbs" and can't get in the groove. Their first feeling is to throw in the towel and go home. By lunch time, this feeling has disappeared and things are normal again.

If these men were permitted to go home, off-days would certainly increase. I've seen some men wash up and change clothes, then change back to their overalls. This period of changing clothes was enough to chase the blue devil away and make a fresh start.

This mental obstacle does not occur in the shop alone. The foreman, superintendent, plant manager, president, etc., at some time or another have blue devils haunting them. The accountant will say 32 and write 23, or the engineer will put down $3 \times 3 = 6$.

Sometimes fatigue will bring this condition about, caused by long hours or a sleepless night. In this case the man should be sent home or allowed to rest.

Frank J. Zarnowski
Rutherford, N. J.

•

GAMBLING ON THE LONG GREEN

I believe Ed is unduly concerned about Reynolds' desire to change jobs. One reason for Ed's objection may of course be due to his not wanting to lose a good worker, because not only does turnover of employees have a distinct bearing on cost accounting, but also the new replacement might not be as efficient or productive.

It is true that on the economic side Reynolds is taking a chance. However, since he is young, and I infer has no one greatly dependent on him, his failure would not handicap him to any real extent.

Although Ed is inclined to view the situation from a pessimistic standpoint, there is a brighter side. First of all, Reynolds has that initiative which has been the asset of all our top industrialists. Certainly new ventures are subject to failure, but on the other hand many have proved successes, with consequent financial rewards. Consider, too, that if the desire to get ahead is stifled, either through what we call economic security, or through discouragement by the misplaced sympathy of superiors, one gets in a rut from which it is difficult to emerge.

Benjamin Franklin, the Wright brothers and Henry Ford were not afraid to take a chance. We see the

rewards which their efforts brought, not only to them, but also to the whole world.

So I say to Reynolds: "Take your chance and good luck!"

Milton E. Sussman
Brooklyn, N. Y.

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METHODS-TIME MEASUREMENT — *By Harold B. Maynard, G. J. Stegemerten, and John L. Schwab President, General Manager, and New England Division Manager, respectively, of the Methods Engineering Council. Published by the McGraw-Hill Book Company, 330 West 42nd St., New York 18, N. Y. 292 pages. Price $3.75.*

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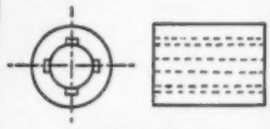

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Cut finishing time in half in the plant of one Chicago manufacturer — Saved him 75 hours on one job alone. The same percentage of savings is reported on jobs of similar nature.

For plastic molds, for dies and gages — Hyprez produces better finishes faster, and at less cost.

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cedure then consists of breaking down operations into their basic motions and assigning the corresponding time standards.

Comprehensive in its scope the book contains a total of 29 chapters and explains not only the methods-time procedure as such but also the general procedure of methods development and the application of the procedure to a variety of shop problems actually encountered.

•

MACHINE DESIGN—*By M. F. Spotts, Associate Professor of Machine Design, The Technological Institute, Northwestern University. Published by Prentice-Hall, Inc., New York, N. Y. 395 pages. Price $6.65.*

Complete chapters on such basic subjects as stress, torsion and a background chapter on strength of materials provide fundamental information necessary for the design of machinery. The text is confined mainly to machine elements, such as springs, screws, gears, bearings and belts. Explanations of these are complete.

Derivations of formulae and problems for illustration are included. There are 406 illustrations, including drawings and photographs, and a number of charts and tables as well, in this text.

The final chapter discusses engineering materials, giving characteristics and properties of each along with general definitions. The book is a well-written text and generally avoids long-winded phrases often found in such material.

•

MECHANICS OF MACHINERY — *Third Edition. By C. W. Ham and E. J. Crane. Published by McGraw-Hill Book Company, New York, N. Y. 531 pages. Price: $5.00.*

The third edition of this standard text on kinematics includes additional chapters on vibrations and critical speeds in shafts—lateral and torsional vibrations, and the gyroscope. An appendix presents approximate methods for constructing involute and cycloidal gear profiles. Other internal changes have been made in the sections on cams, gears, flywheels and governors, and on balancing aircraft engines.

As in the first and second editions, the text is well illustrated with link drawings, force diagrams and machinery sketches. In general, mathematical solutions of machinery problems are supplemented where possible with graphic solutions.

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GEAR MACHINES
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Cross Universal Gear Machines embody advanced engineering developments to obtain highest productivity and assure lowest possible operating costs.

They feature utmost flexibility for handling a wide variety of gears. Continuous cutting motion, exclusive with Cross, speeds production at top efficiency.

Special skill is not required because machines are automatic and push button controlled. Power clamping is foot pedal controlled. Both hands are free for work handling.

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spur gears
helical gears
clutches
splines

Typical productivity when rounding or pointing 8 pitch 30 tooth gears is 55 net hourly.

No. 65

For pointing or chamfering external and internal:

clutches
spur gears
bevel gears
splines

Typical productivity when pointing 10 pitch 30 tooth gears is 100 net hourly.

No. 75

For burring or chamfering both ends at the same time.

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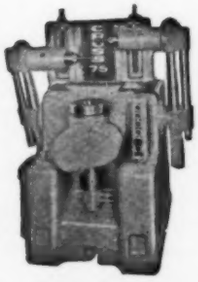
spiral bevel pinions
hypoid pinions

Typical productivity when chamfering 8 pitch 40 tooth gears is 200 net hourly.



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LIVE CENTERS

Lawrence G. Lang, Westinghouse machinist, turning 10" bar FS #3848 with Ideal Live Center. Feed is .022 @ 200'/min. Tool is Kennametal.

. . . in the words of G. Young, tool supervisor at the Nuttall Plant of Westinghouse Electric Corp., Pittsburgh: "Since installing Ideal Live Centers we have had no 'down' time due to center wear."

What happened at Westinghouse is a typical case history. When they switch to Ideal Live Centers users save from 20 to 50% and raise the quantity and quality of lathe output. They get deeper cuts at higher speeds with no burning of work or center. There's no friction—no grabbing—no gouging—no time loss on lubricating and grinding—less spoilage—more profit per man hour!

The Ideal "Multi-Duty" Live Center is available from stock with male, female, and pipe type inserts; also Heavy Duty Live Center, built to carry heavy loads—accurate to .0005. Ask for information and free demonstration today. IDEAL INDUSTRIES, Inc., Sycamore, Ill.

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"Quotes"

Sweden Shrinks Time and Motion Study Disputes

Labor-management strife over time and motion study techniques will soon be virtually non-existent in Sweden, said Prof. Robert Kristensson of the Royal Institute of Technology, Stockholm, Sweden, at the third annual Time Study and Methods Conference of the Society for the Advancement of Management and the Management Division of the ASME.

Professor Kristensson said that cooperation between unions and management on an industry-wide basis is an accomplished fact in Sweden and that the many sore points now present in the American system of collective bargaining have been eliminated by education and union participation in Sweden on a level not yet attempted in America. Where physiological differences in work effort for various types of work are just beginning to get attention in America, controlled energy metabolism tests have been conducted in Sweden with the results that certain piece-rates are standardized for entire industries based on the number of calories consumed in a day's work for a given job.

The techniques of time study and methods work are universally recognized by the unions and have been extended to all walks of life, even to the farm where improvements of 200 to 300% per man per day have been realized in hay harvesting. The main reason for this tremendous increase, said Professor Kristensson, was due to the releasing of the workers' motivation drive which is possible only where there is no distrust or ignorance and strife concerning the work and procedures involved.

Time study and methods techniques are taught to the workers, and time study executives are invited to give lectures on time and methods studies to union conferences. Production committees composed of equal representatives of labor and management are in every plant and it is their job to boost production in any way they can, thereby putting part of the responsibility for efficient management on the union.

Professor Kristensson pointed out that most of the employers in Sweden are organized in associations which are members of the Swed-

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Your local jobber or distributor will be glad to help you choose a Star Blade to suit your job, ask him for the NEW Star Wall Chart for your shop . . . the Star Metal Cutting Booklet for pocket or tool kit—they both contain a world of useful information and are absolutely FREE.

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Makers of hand and power hack saw blades, frames, metal cutting band saw blades and the Clemson Lawn Machine.
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SHAPER

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The 8" Hy-Duty Model Shaper, taking a full 8" cut, is unexcelled for tool and die makers and small instrument manufacturers.

SHAPE-RITE SHAPERS are engineered to provide faster set-ups . . . one of the most important time-saving elements for greater production.

Maximum versatility . . . controls within easy reach . . . and many other built-in features cut set-up time to a minimum and eliminate many costly jigs.

Furnished with plain or swivel table, the SHAPE-RITE SHAPER provides fast economical operation. Investigate it now!

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from FLAT SURFACES TO INTRICATE SHAPES with the New DI-ACRO BRAKE

- ROK-LOK—new sensitive material clamp increases accuracy
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This versatile metal forming machine was developed for use in model shops, experimental laboratories and production departments where it often replaces dies for all types of precision forming operations. Di-Acro Brakes will form a great variety of materials including bronze, stainless steel, aluminum and bi-metals.

WRITE FOR CATALOG. New edition of 40-page Di-Acro Catalog contains detailed information on all Di-Acro Brakes, Shears, Notchers, Rod Parters, Benders, and Punches and illustrates how these precision machines can be used individually or cooperatively for "DIE-LESS DUPLICATING".

DI-ACRO is Pronounced "Dio-Ack-Ro"

DI-ACRO PRECISION MACHINES DIE-LESS DUPLICATING
O'NEIL-IRWIN MFG. CO.
8TH AVE., LAKE CITY, MINNESOTA

ish Employers Federation. The workers are also organized into national unions which are members of the Confederation of Trade Unions.

Unions and management can and must work together if production stoppages are to be eliminated and the general standard of living raised by increased production at lower costs.

TO THE EDITOR

WHY DO APPRENTICES QUIT?

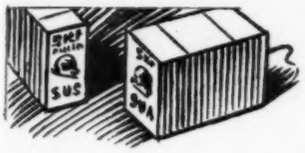
In answer to Wm. F. Patterson's article (A. M. Aug. 26), apprentices quit for a number of reasons. Among them is dissatisfaction at being kept too long on uninteresting jobs when they expect to be learning new things. The old idea of putting a boy on a bolt cutter and keeping him there until he kicked too hard was outmoded years ago. Getting and keeping a boy's interest is one of the problems of keeping apprentices.

A railroad-shop superintendent I knew had what seems to be an excellent plan. He put a new boy with the erecting gang as a helper to run errands for tools and parts, before he put him on any machine. His theory was that in this way the boy learned the names of the various parts of a locomotive and the names of the tools used. Of even greater importance, he learned the different types of fits required for the various working parts. He learned that the piston end of the connecting rod should have a good fit on the crosshead pin but that the back end, on the crankpin, had to be a free fit. Most shops could adopt a similar plan to advantage.

Unscrupulous rival shops with no training courses frequently entice boys away after they have learned part of the trade. Some boast of "letting the other shop train our men." They can offer higher wages but the boy is usually handicapped in the long run.

If the young man's matrimonial instinct is too strong, he is likely to forget his obligations to the shop which is training him. Perhaps a heart-to-heart talk with the lady love might make her see the advantages of finishing his training by pointing out the better chances they would have with steady work at better pay for him at the end of his apprenticeship. This might be a profitable part of the personnel manager's job.

Fred H. Colvin
Point Pleasant, N. J.



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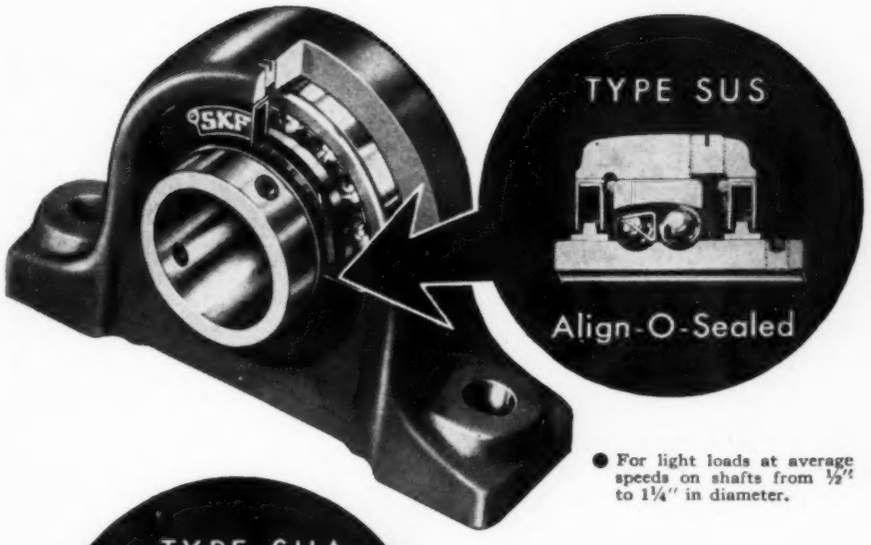

● For light loads at average speeds on shafts from ½" to 1¼" in diameter.

● For shafts from 1 7/16" to 2 7/16" in diameter which are required to carry heavier loads than SUS units. Adapter mounting. TYPE SUAR — Same pillow block with spherical roller bearings.

Meet the youngest members of the SKF family of pillow blocks: SUS and SUA, both unit type pillow blocks. They come to you completely assembled, ready for quick installation.

Having self-aligning ball bearings, they automatically compensate for misalignment and shaft deflections without binding, insuring equal load distribution.

Their exclusive Align-O-Seals—with their close, leakproof fit—keep the bearings safe from lubricant leakage and the intrusion of dust, dirt and moisture.

SKF Bearings and their Pillow Blocks are manufactured under the closest precision control. When brought together, they fit like a glove.

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THE EXCLUSIVE SKF ALIGN-O-SEAL

A ring rotates with the shaft and within the U-shaped section of a circular cover. In the inside wall of the cover, facing the bearing, are evenly spaced holes which act as relief valves for excess grease. Over-greasing of the bearing is automatically relieved through these holes.

● *Send for Catalog 280, second edition.*

● *For replacement pillow blocks, consult your nearest Authorized SKF Distributor.*

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The new Snyder plant is unique in that it was designed and built specifically for the production of special-purpose machinery and is one of the most perfectly equipped and efficient plants in the world. In nearly a quarter-century of operation the Snyder organization has created an immense variety of special-purpose machines for many industries—aircraft, automotive, coal mining, farm equipment, electrical, food processing, glass, oil, pharmaceutical, railroad, refrigeration, valve manufacturing, etc. Whether applied to production or to assembly, all these machines have a common objective—to control the factors which control costs (time, precision, finish, scrap, fatigue, safety) and thus to control profits. If your objective is high production at low unit cost, we invite your inquiries.

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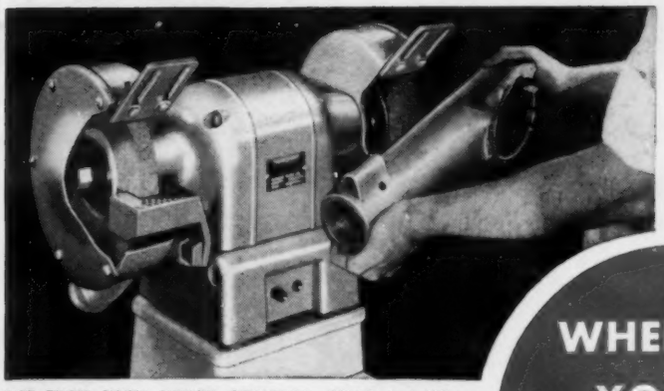
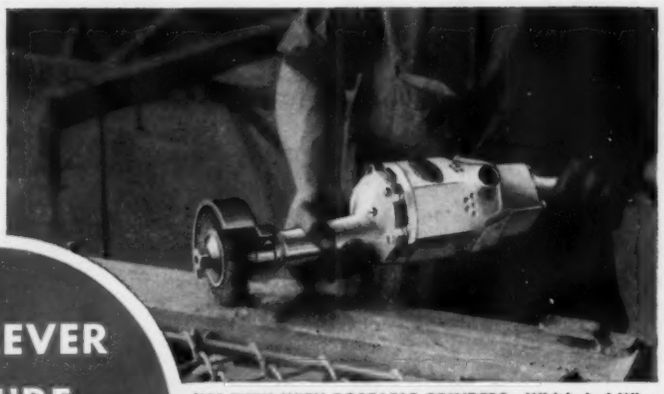
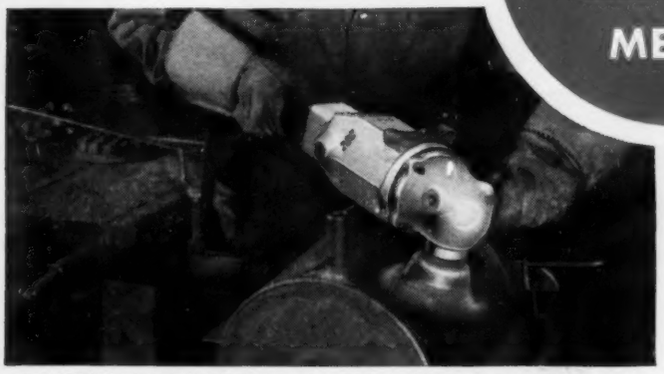


USE THEM WITH BENCH GRINDERS—Whirlwind Wire Wheel Brushes come in six wheel sizes from 4" to 12"; in 1, 2 or 3 sections; and in .014", .0118" and .005" wire. Adaptors fit them to almost any arbor or spindle.

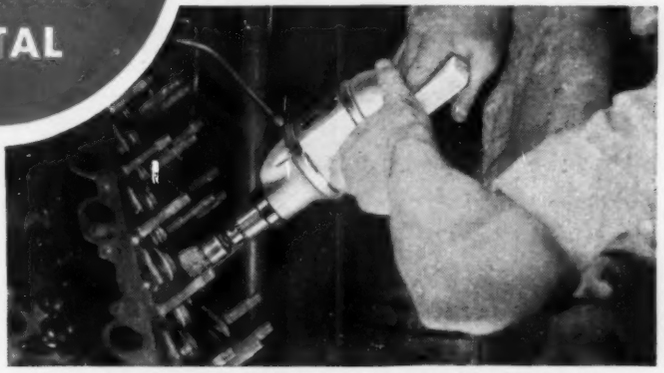


USE THEM WITH PORTABLE GRINDERS—Whirlwind Wire Wheel Brushes come in 4" to 8" wheel sizes; made of .014" wire for rough cleaning, .0118" wire for high-speed buffing, .005" wire for fine burnishing.

WHEREVER YOU'RE CLEANING METAL



USE THEM WITH PORTABLE SANDERS—Whirlwind Wire Cup Brushes come in 4", 5" and 6" sizes, made of .022" wire for tough cleaning jobs. Brush has ⅝", 11-thread bushing; threads on Sander spindle.



USE THEM WITH ELECTRIC DRILLS—Small Whirlwind Cleaning Brushes are ideal for work in close quarters. Available in several shapes, fitting angles, cavities and grooves.

BETTER BUY WHIRLWINDS*

for Better Brushing at Top Speed

Black & Decker *Whirlwind* Wire Brushes save money, muscle and man-hours on many a tough job! (1) They speedily remove rust, carbon, scale, old paint, light weld spatter, grease or road tar. (2) Clean machinery, parts, castings, tanks, structural metal, automobile chassis and under fenders. (3) Prepare surfaces for welding. (4) Produce a fresh surface that holds paint better. (5) Do high-speed buffing and fine burnishing or finishing. You can use them on practically any spindle . . . and particularly on Black & Decker Electric Bench Grinders, Portable Grinders, Sanders and Drills. They're built right in our own plant, on special machinery, for extra toughness, extra life, extra performance! Order them by name today . . . *"WHIRLWIND"* . . . from your nearby Black & Decker Distributor. Write for free catalog of many Portable Electric Tools to: The Black & Decker Mfg. Co., 616 Pennsylvania Ave., Towson 4, Maryland.

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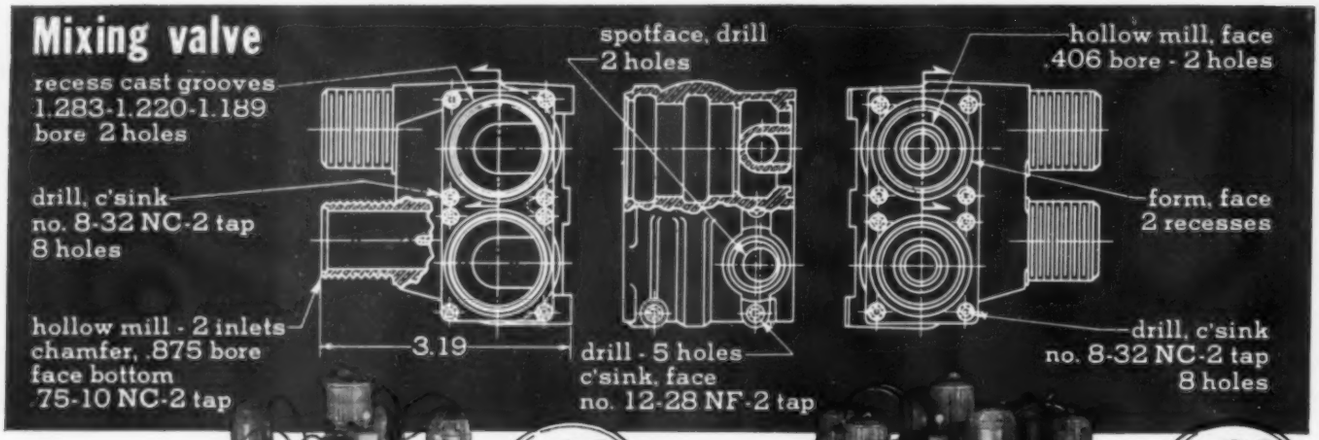
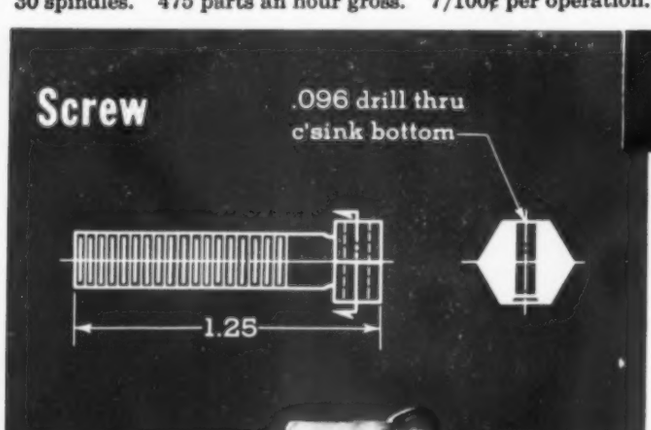
PORTABLE ELECTRIC TOOLS



A horizontal indexing machine with central column has 16 units that perform the operations above at the left. The machine has a 60-inch power index table with 12 stations. 30 spindles. 475 parts an hour gross. 7/100¢ per operation.

A second similar machine completes the operations. The central column supports 6 vertical units, and knees bolted to the base 11 horizontal units. Bushings guide the drills. 45 spindles. 462 parts an hour gross. 5/100¢ per operation.



A vertical machine has a drilling unit, a countersinking attachment underneath and a V-block fixture with automatic ejection. The operator merely loads. The rest is automatic. 2 spindles. 1440 parts an hour gross. 10/100¢ per operation.

Accurate operations

Man and machine together cost a fraction of 1¢ per tool per part. On the simple job at left only 10/100 of 1¢. On the complex job above only 6/100 of 1¢. For that fraction of a penny every part is uniform, and every operation is in exact location.

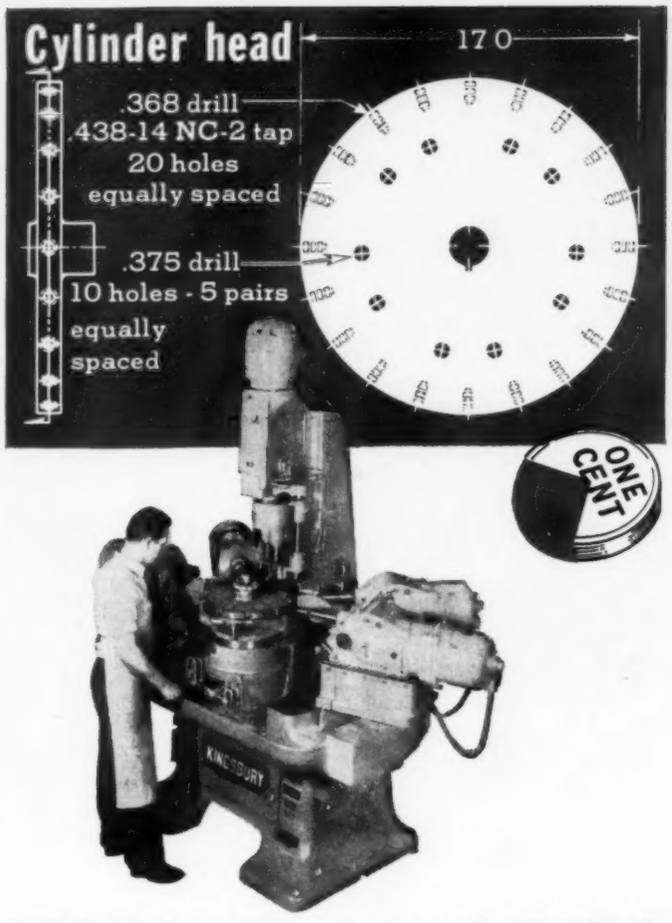
Many all-purpose machines can do these operations. But none can match the cost. Few can match the accuracy and uniformity. Here is why:

More output per man hour. One machine performs many operations at a high production rate.

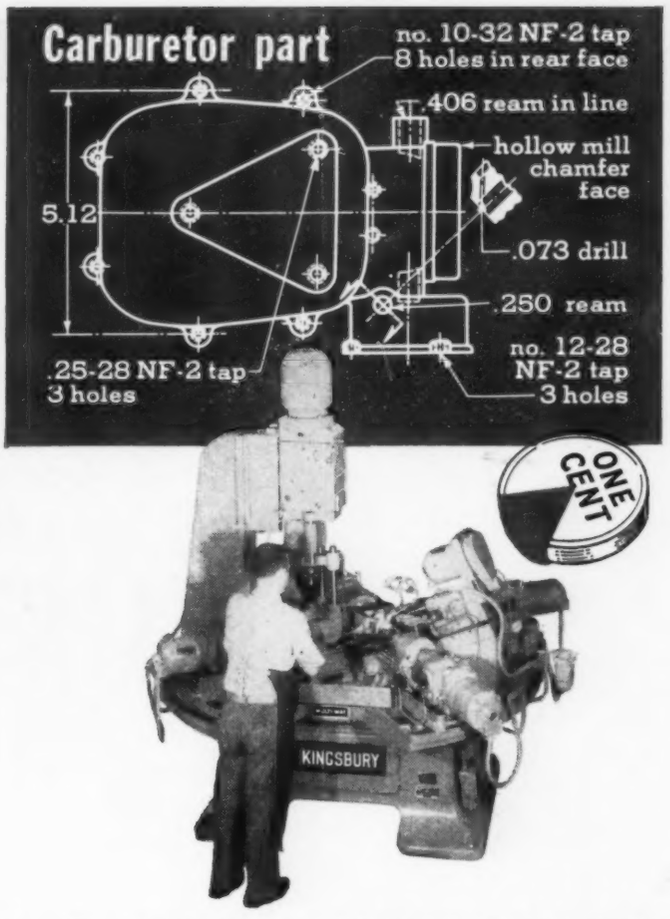
Uniform product. Automatic work cycles never vary. Fixtures that index are exact duplicates.

Accuracy. No handling or relocating of work until finished. Bushings guide drills and reamers.

KINGSBURY



An indexing fixture rotates one part on its axis 36° each index. Two pairs of units drill and tap 20 holes. One unit with 2-spindle head drills two .375 holes every other index. 6 spindles. 24 parts an hour gross. 27/100¢ per operation.



A multi-way non-index machine has 7 units that operate from 5 directions in 2 chuckings. The operator changes parts in one fixture while units operate on a part in the other. 18 spindles. 150 parts an hour gross. 16/100¢ per operation.

at amazing low cost

Less handling, less space. Fewer machines.

Superior construction. We use 11 jig borers, 9 boring machines, homocarb and relieving furnaces, induction heater, gear shaver, thread grinder, etc.

Short pay-off period. Usually 1 to 3 years.

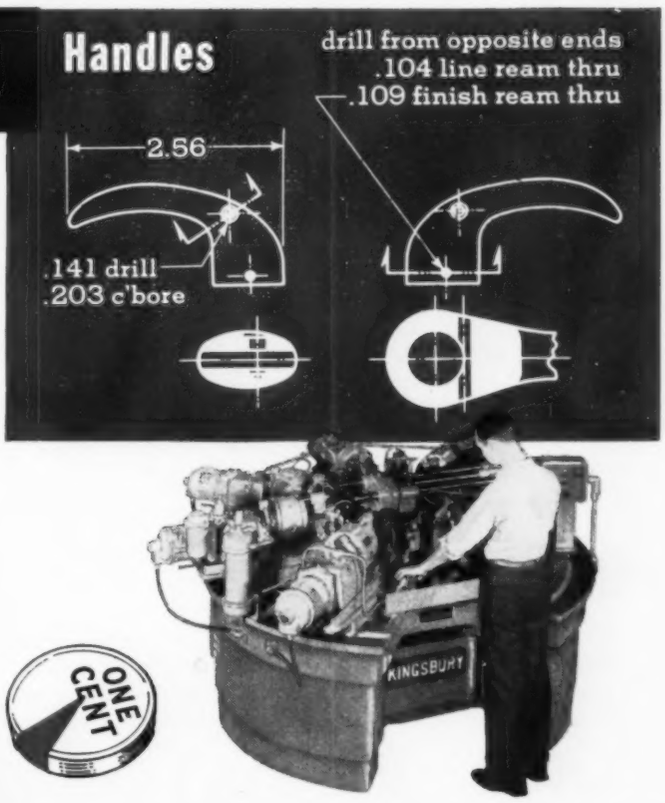
Proposals. If you have a high production job with operations like these, ask our Mr. L. A. Carll for a proposal on a tooled machine. Send him a print showing the operations and hourly output you need. Free bulletins show 40 setups. Kingsbury Machine Tool Corp., 20 Laurel St., Keene, N. H.

(For every cost here we figured on a generous wage rate. We assumed the machine would run at 80% efficiency for 6000 hours, a fraction of its useful life. No power or overhead.)

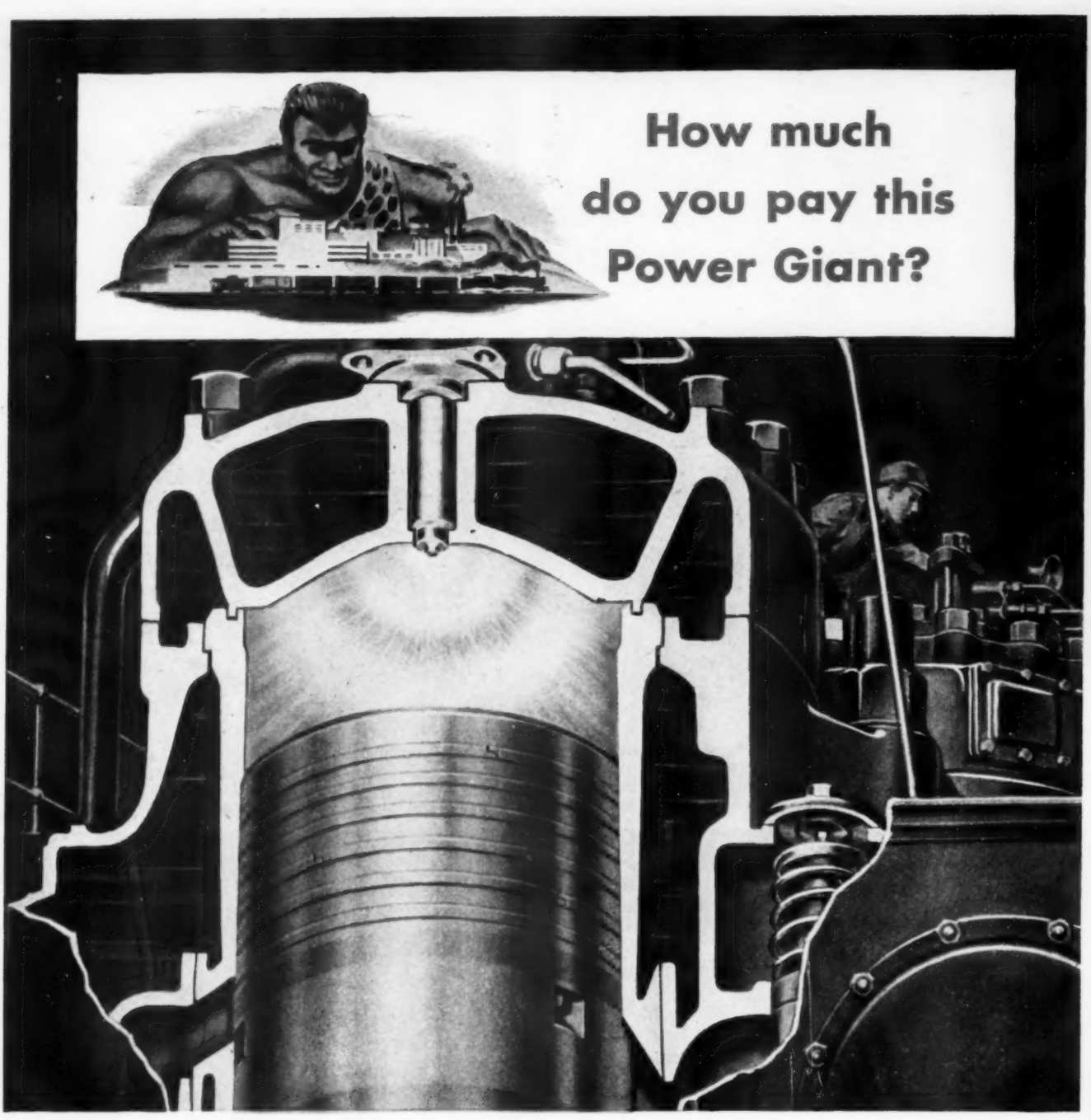
63

AUTOMATIC DRILLING AND TAPPING MACHINES

for Low-Cost High Production



A horizontal indexing machine has 6 units with 2-spindle heads. Each works on a left and a right hand part at the same time. Clamping, unclamping and ejection is automatic. 12 spindles. 642 pairs an hour gross. 7/100¢ per operation.



Correct Lubrication Reduces Friction Losses, Cuts Your Power Bill

This giant engine represents the power that turns the wheels in your plant. It happens to be a Diesel. It might be a steam engine . . . or turbine. But no matter how you get your power, you're paying for it.

Correct Lubrication by Socony-Vacuum will cut your power costs by reducing friction losses throughout your plant. Records kept by representative firms show important savings. And these savings in power costs can pay for the lubricants that make them possible.

Yet this is only one of four benefits from the right oils, correctly applied. You also get more continuous production and lower maintenance and lubrication costs. Where else can you get so much—for so little?

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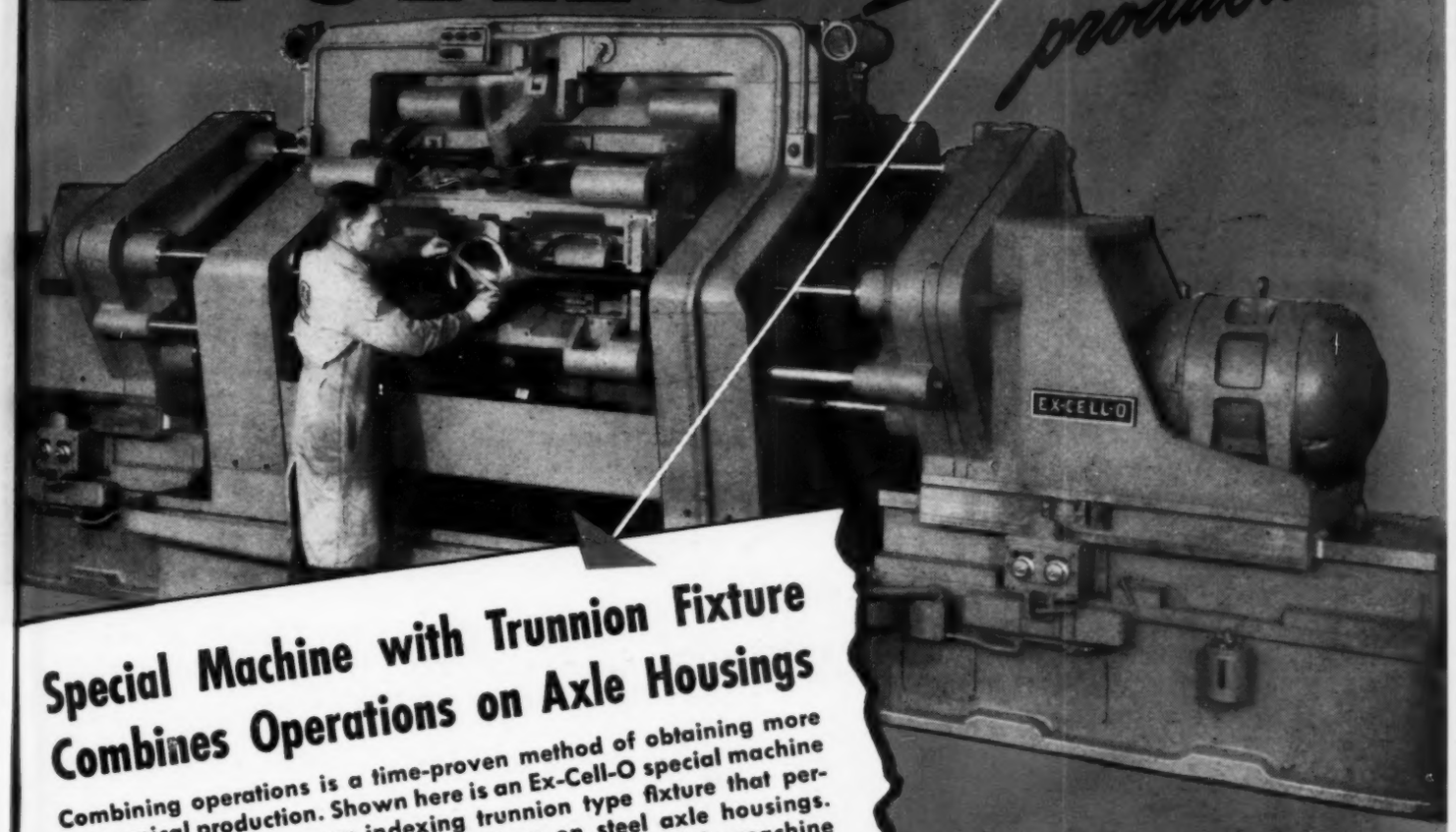
EX-CELL-O

Can give you more economical production



Special Machine with Trunnion Fixture Combines Operations on Axle Housings

Combining operations is a time-proven method of obtaining more economical production. Shown here is an Ex-Cell-O special machine with a six-station power indexing trunnion type fixture that performs roughing and finishing operations on steel axle housings. Standard hydraulically-actuated slides at both ends of the machine carry multiple spindle heads and their drive motors. Another slide at the rear supports a precision spindle and a facing head.

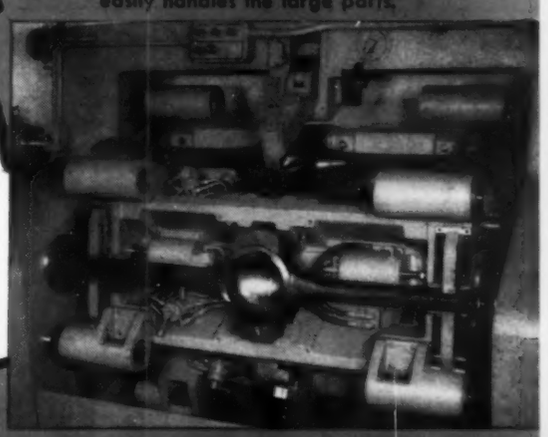
The tool holders in both the multiple spindle heads are rigidly guided by bushings in the fixture end frames. Coolant is manifolded to each station and directed through drilled holes to the point of contact between the tools and the work.

Parts are laid in the loading station and are located and clamped hydraulically. Operations are rough, semi-finish bore and ream bearing diameters at both ends; rough and finish face flanges, chamfer inside and outside edges of flanges and turn O.D. of flanges at both ends; face banjo. All these operations are performed at a net production rate of 55 pieces per hour!

Let Ex-Cell-O help you combine operations for more economical production. A complete staff of experienced machine tool engineers is ready to help you with your production problems. Contact your Ex-Cell-O representative today!

Above: Ex-Cell-O special machine performs many operations on steel rear axle housings.

Below: Close-up view of the Ex-Cell-O six-station trunnion type fixture which easily handles the large parts.



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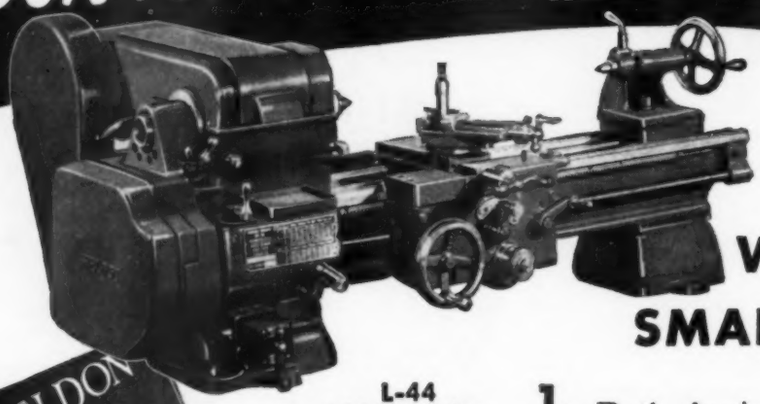
Detroit 32, Michigan

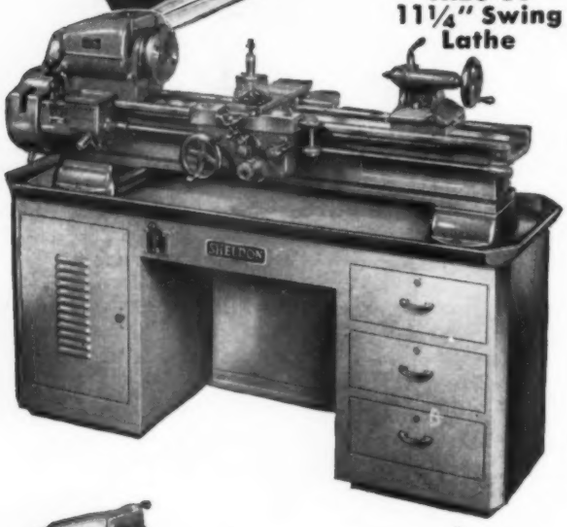
Special Multiple Way-Type Precision Boring Machines • Special Multiple Precision Drilling Machines • Precision Boring, Turning, and Facing Machines and Fixtures • Precision Cylinder Boring Machines • Precision Thread Grinding Machines • Precision Lapping Machines • Precision Broach Sharpening Machines • Other Special Purpose Machines • Tool Grinders • Continental Cutting Tools • Broaches and Broach Fixtures • Counterbore Sets • Grinding Spindles • Hydraulic Power Units • Drill Jig Bushings • R.R. Pins and Bushings • Fuel Injection Equipment • Dairy Equipment • Aircraft and Miscellaneous Production Parts

Look for these new Features...



WHEN BUYING SMALL LATHES

L-44
10⅛" Swing
Lathe



Sheldon
TRBS-56
11¼" Swing
Lathe

Sheldon
TU-1248P
13⅛" Swing
Lathe

1. Both basic (a) and operating (b) accuracy of the bed—(a) Ways held to tolerances of .005" per foot horizontal and parallel alignment. (b) Engineered distribution of mass to give extreme rigidity without excessive bulk.

2. Timken Precision Taper Roller Bearings — for regular operating speed and permanent accuracy.

3. Increased Collet Capacity.

4. Greater Swing for size.

5. Greater Power at tool point.

6. V-Belt Motor Drive with increased speed range.

7. Lower prices—far more tool for the money resulting from modern manufacturing methods, in a specially built plant that is "tooled to the teeth" with the finest machine tool building equipment.

Write for the New G-48 Catalogue of Sheldon Lathes and check each for these 7 important features.

SHELDON MACHINE CO. Inc.
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
4239 N. KNOX AVENUE • CHICAGO 41, ILLINOIS, U.S.A.

YOU GET ALL THESE ADVANTAGES IN

NICHOLSON ROTARIES

HAND CUT AND MACHINE GROUND

STYLES

A wide range of shapes and sizes from which to choose. Name almost any rough or delicate finishing operation that is "bogging down" your production and Nicholson will come up with a Rotary File or Bur that will save both time and money.

CUTS

Available in either Hand Cut (for use on tough, dense materials) or Ground-from-Solid (for non-ferrous metals). Three degrees of coarseness: coarse (C), medium (M), and fine (F). Expert hand-cutters form the teeth of Nicholson Rotary Files; precision machines grind the flutes of Nicholson Burs.

STEEL

Nicholson regular Rotary Files and Burs are made from a special grade of high-speed steel, expertly hardened and carefully shaped.

SHANKS

Standard shanks are ¼" in diameter. Nicholson also has a complete line of Rotary Files and Burs with ⅛" shanks. These "little fellows" are ideal for relatively delicate power filing. They, too, are made from high-speed steel—with one degree of coarseness only.

CODE SYMBOLS

The Nicholson system of identification makes for easy ordering. The first symbol identifies the style or shape of the head; second, the diameter of the head; third, the length of the head; and fourth, the coarseness of the cut.

TRADE-MARK

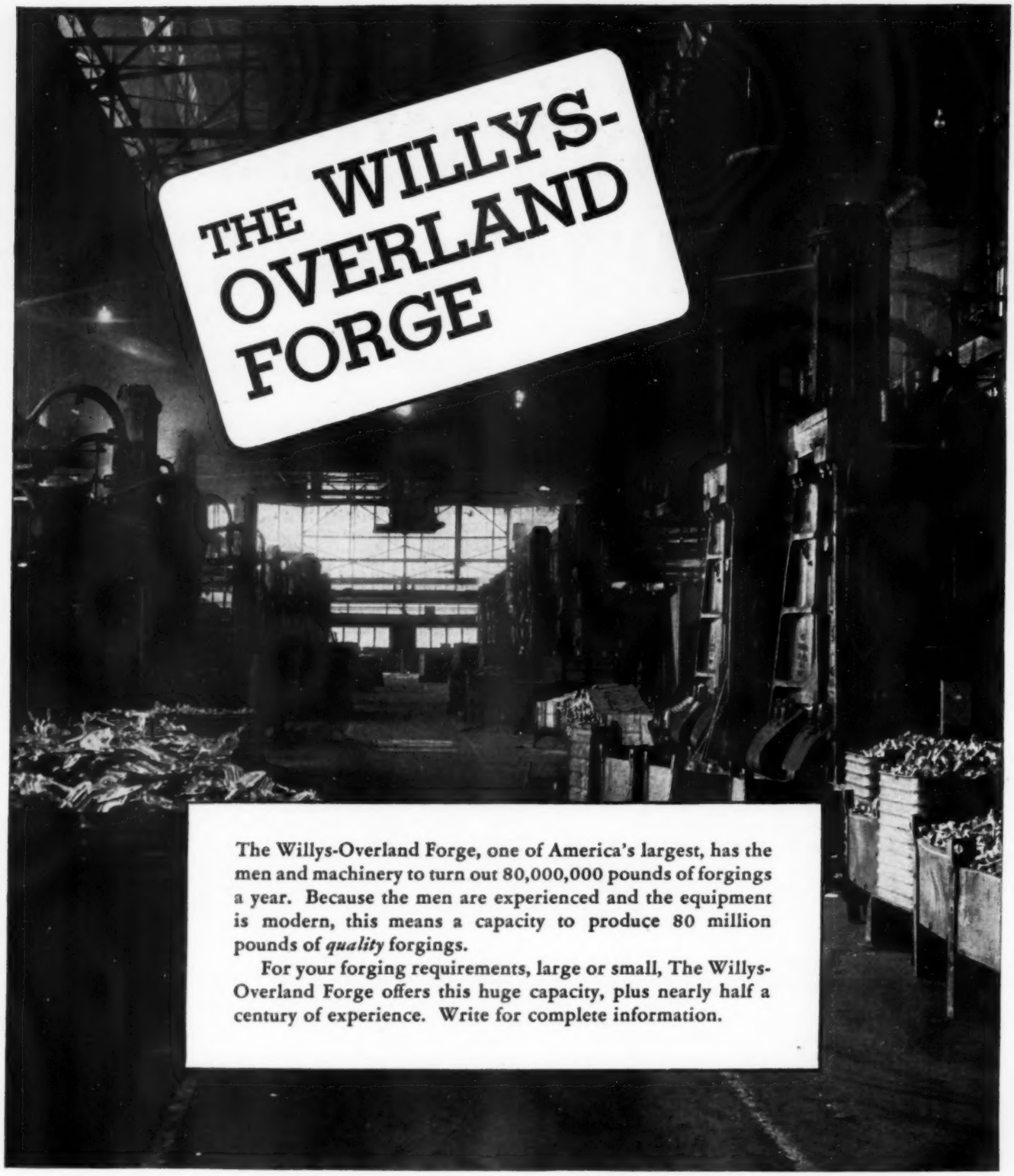
The famous Nicholson trade-mark is your assurance of finest quality obtainable. Keep in mind that Nicholson Rotary Files are carefully shaped, true-centered, accurately cut or ground, expertly hardened. Available through your industrial distributor.

NICHOLSON FILE CO., 97 ACORN ST., PROVIDENCE 1, R. I.

(In Canada, Port Hope, Ont.)

NICHOLSON ROTARY FILES NICHOLSON U.S.A.

HAND CUT AND MACHINE GROUND **HIGH SPEED STEEL AND CARBIDE**



The Willys-Overland Forge, one of America's largest, has the men and machinery to turn out 80,000,000 pounds of forgings a year. Because the men are experienced and the equipment is modern, this means a capacity to produce 80 million pounds of *quality* forgings.

For your forging requirements, large or small, The Willys-Overland Forge offers this huge capacity, plus nearly half a century of experience. Write for complete information.

Part of The Willys-Overland Forge, which covers 5 buildings.

THE WILLYS-OVERLAND FORGE

WILLYS-OVERLAND MOTORS, INC.
TOLEDO 1, OHIO

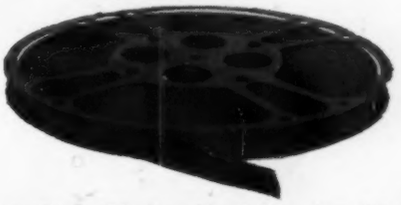
DROP FORGINGS • HOT PRESS FORGINGS • UPSET FORGINGS

Added Life . . . for the Pine Tree Broach

THE hardest and toughest tool steels ever worked have been developed for LAPOINTE broaches in the turbo-jet program. These broaches which form blade, bucket and vane roots, as well as their wheel counterparts, now have added the exclusive Electrolizing process . . . perfect combination for longest broach life.

Already standard specification for much of the jet-turbo tooling, Electrolizing is a new and remarkable scientific process that utilizes high voltage and a chemical bath to coat the entire surface of the broach with a hard alloy. This .00003 of an inch "skin" increases tool life from 300% to 1000% by reducing chip and surface friction. Dimensional accuracy and ease of sharpening is unaffected.

Save "down-time" and tool costs with LAPOINTE broaches Electrolized.



HUDSON LAPOINTE MASS.

THE Lapointe MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS • U. S. A.

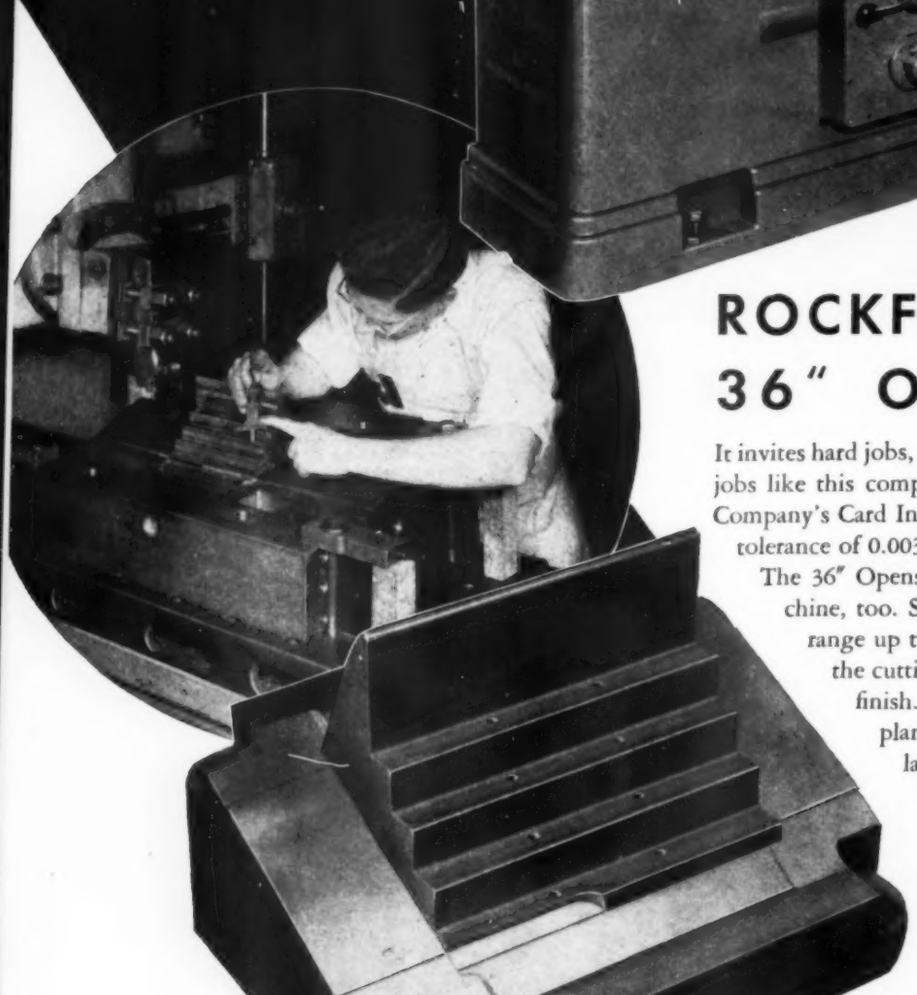
Branch Factory • Edgware • Middlesex • England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHES AND BROACHING MACHINES

Write today to Dept. 73 for this folder describing the new 17-minute 16-mm. Kodachrome sound movie produced by LAPOINTE entitled "Tooling for Jet Propulsion."

WANTED:

Tough Assignments for this machine



ROCKFORD *Hy-Draulic*
36" Openside Shaper

It invites hard jobs, the kind that are too difficult for ram type shapers jobs like this compound angular die for Burrough's Adding Mach Company's Card Index Case . . . cut out of tough die casting steel t tolerance of 0.003".

The 36" Openside Shaper is an exceptionally fast production m chine, too. Set-ups are quickly and easily made. Cutting spe range up to 110 ft. per min. and are infinitely adjustable, w the cutting stroke maintained at uniform speed from start finish. Reversal is quick and return rapid. Full-leng planer type table support permits machining of w large or heavy work . . . and assures exceptiona high precision cutting, often eliminating the ne for further finishing operations.

It will be well worth your while to find out h a Rockford *Hy-Draulic* Shaper, Planer, Shap Planer or Slotter might speed up or impro operations in your shop. Send your bluepri to our engineering department and we will furn machine time estimates for comparison.

ROCKFORD MACHINE TOOL CO
ROCKFORD ILLINO

4807

Hy-Draulic
REG. U. S. PAT. OFF.

SHAPERS

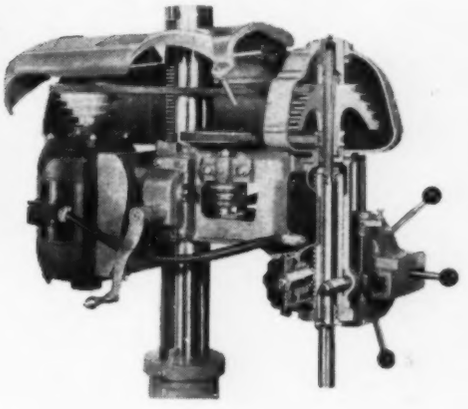
PLANERS

SLOTTERS

SHAPER-PLA

FOR EXAMPLE

Model D-1101X Power Feed. Price: less motor and column $216.00
D-1100X Hand Feed. $135.00*



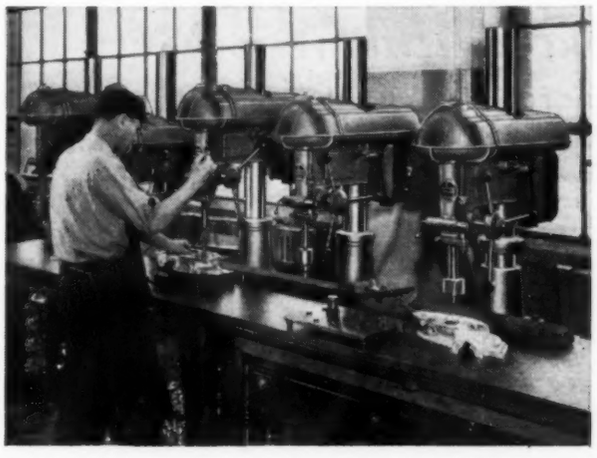
HARLEY-DAVIDSON PERFORMS *110 SEPARATE OPERATIONS* WITH WALKER-TURNER 20" DRILL HEADS

Walker-Turner Light Machine Tools solve a dual problem for the Harley-Davidson Motor Co., Milwaukee, Wisconsin, in the production of their new lightweight model motorcycle. They fill the need for *standard* machine tools capable of handling approximately 110 *separate* drilling, tapping and spot-facing operations, and *eliminate the necessity for replacing expensive, special machines when models change.*

In set-ups devised by Harley-Davidson engineers, over 100 Walker-Turner Drill Heads machine motor, brake plate and crank-case assemblies. The equipment drills holes ranging from ⅛" to 1" in diameter at spindle speeds from 260 to 2600 r.p.m. When necessary, accuracy to .001" is attained. Both high-speed steel and carbide tools are employed.

Here again, Walker-Turner Light Machine Tools demonstrate their flexibility. Compact and rugged, Walker-Turner Light Machine Tools work *all* materials from wood and plastics through tool steel . . . set new high production records . . . give long, trouble-free service.

For complete catalog, write to Walker-Turner Division, Kearney & Trecker Corporation, Plainfield, New Jersey.



Photo, upper left: **Progressive machining stages at Harley-Davidson: multiple drilling, tapping and spot facing done entirely on set-ups of Walker-Turner 20" Drill Presses.**

Photo, lower left: **Facing internal hubs of cast aluminum. Facing tools are mounted in standard Walker-Turner 20" Drill Presses.**

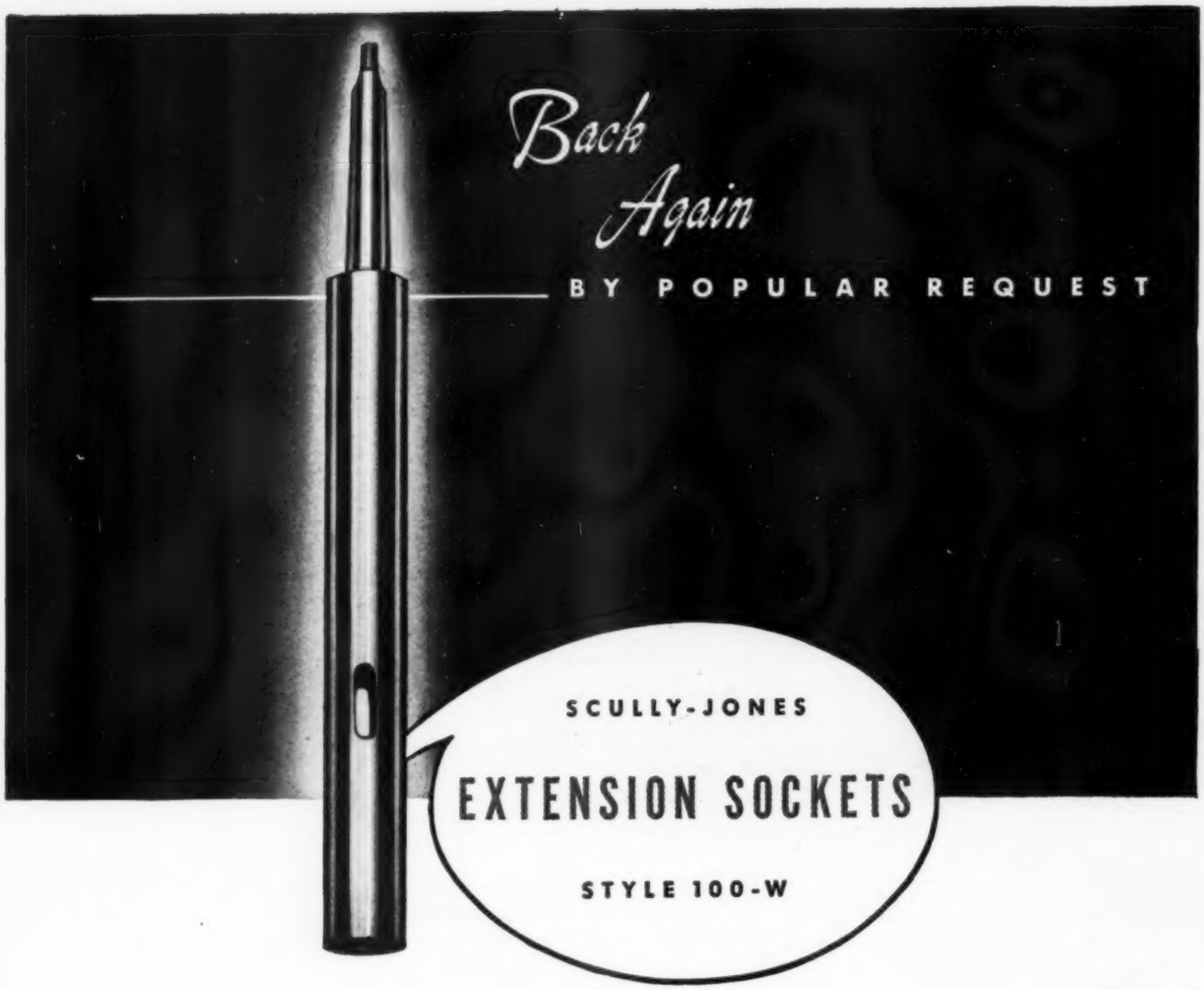
Photo, upper right: **20" Power Feed Drill Press Head, Model D-1101X, Hand Feed Model D-1100X. 4 ball bearings, 6" spindle travel. Five standard spindle speeds, 400 to 2600 r.p.m. with 1740 r.p.m. motor. Capacity 1" in cast iron, ¾" in steel. . . . . Slo-speed motor optional.**

walker-turner MACHINE TOOLS

DRILL PRESSES—HAND AND POWER FEED • RADIAL DRILLS
RADIAL SAWS • BAND SAWS—FOR WOOD OR METAL
RADIAL METAL CUT-OFF MACHINES • MOTORS

4205

SOLD ONLY BY AUTHORIZED INDUSTRIAL MACHINERY DISTRIBUTORS



Reduce the COST OF TOOLING

You can convert spindles to larger or smaller tapers—and extend the spindles in your present Drill Presses, Radial Drills, Turret Lathes, Boring Mills, etc.—to utilize their productive capacity to a greater extent.

IMMEDIATE DELIVERY
ON ALL POPULAR SIZES

LONGER WEAR AND BETTER PERFORMANCE

Made to exact specifications. The tang and hole ends are heat-treated for longer wear and maintenance of concentricity. They will outlast the ordinary soft sockets and perform with greater accuracy.

FURNISHED WITH MORSE TAPER HOLES AND SHANKS *Three Series* LONG • MEDIUM • SHORT

For details see page 215 in Scully-Jones Tool Engineering Manual 500 which shows over 500 types and sizes of cutting tools, collet chucks, boring equipment, centers, etc.

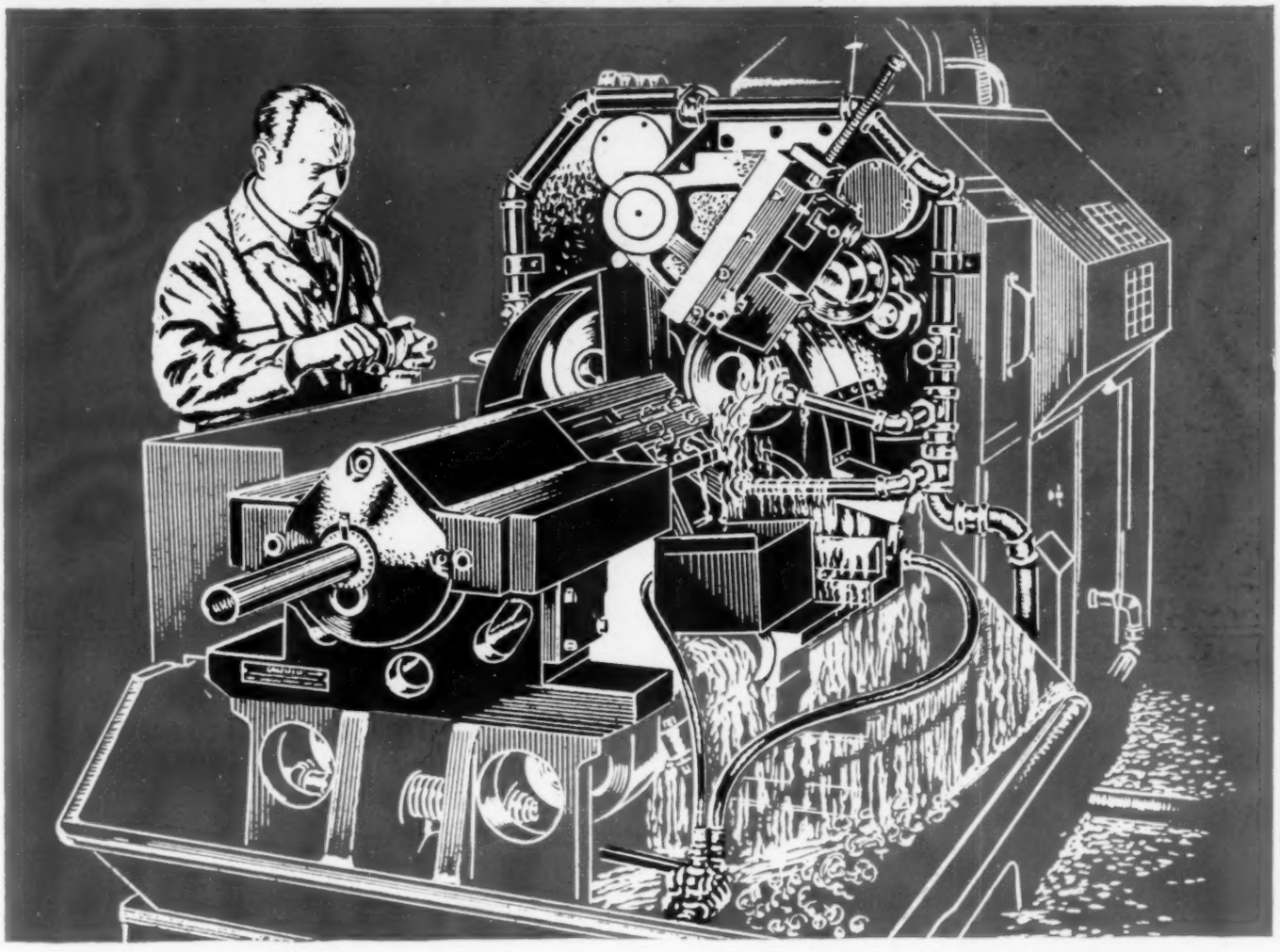
Write for a folder on Extension Sockets.

Scully-Jones AND COMPANY

6169

1902 SOUTH ROCKWELL STREET, CHICAGO 8, ILLINOIS

YES! Tycol Afton Cutting Oils perform better . . . BETTER . . . BETTER



Tycol Afton Cutting Oils perform better because:

. . . *Tycol Afton Cutting Oils* are expertly blended, non-corrosive, sulphurized oils with a "dual purpose" . . . you use them for BOTH cutting and machine lubrication and get better results BOTH ways.

. . . *Tycol Afton Cutting Oils* have quicker cooling properties and completely protect bearings and gears—they will not gum, corrode or tarnish machined parts.

. . . *Tycol Afton Cutting Oils* permit freer cutting and longer tool life by minimizing the build-up on cutting tools . . . closer tolerances and finer finishes are assured.

. . . *Tycol Afton Cutting Oils* fill every requisite for ferrous and non-ferrous metals from light machines to heavy machine broaching work.

For complete information about Tycol Afton Cutting Oils and the other lubricants that make up the complete Tycol line, contact your nearest Tide Water Associated Office today.

LUBRICATION — "ENGINEERED TO FIT THE JOB"

TYCOL

INDUSTRIAL LUBRICANTS

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TIDE WATER ASSOCIATED OIL COMPANY

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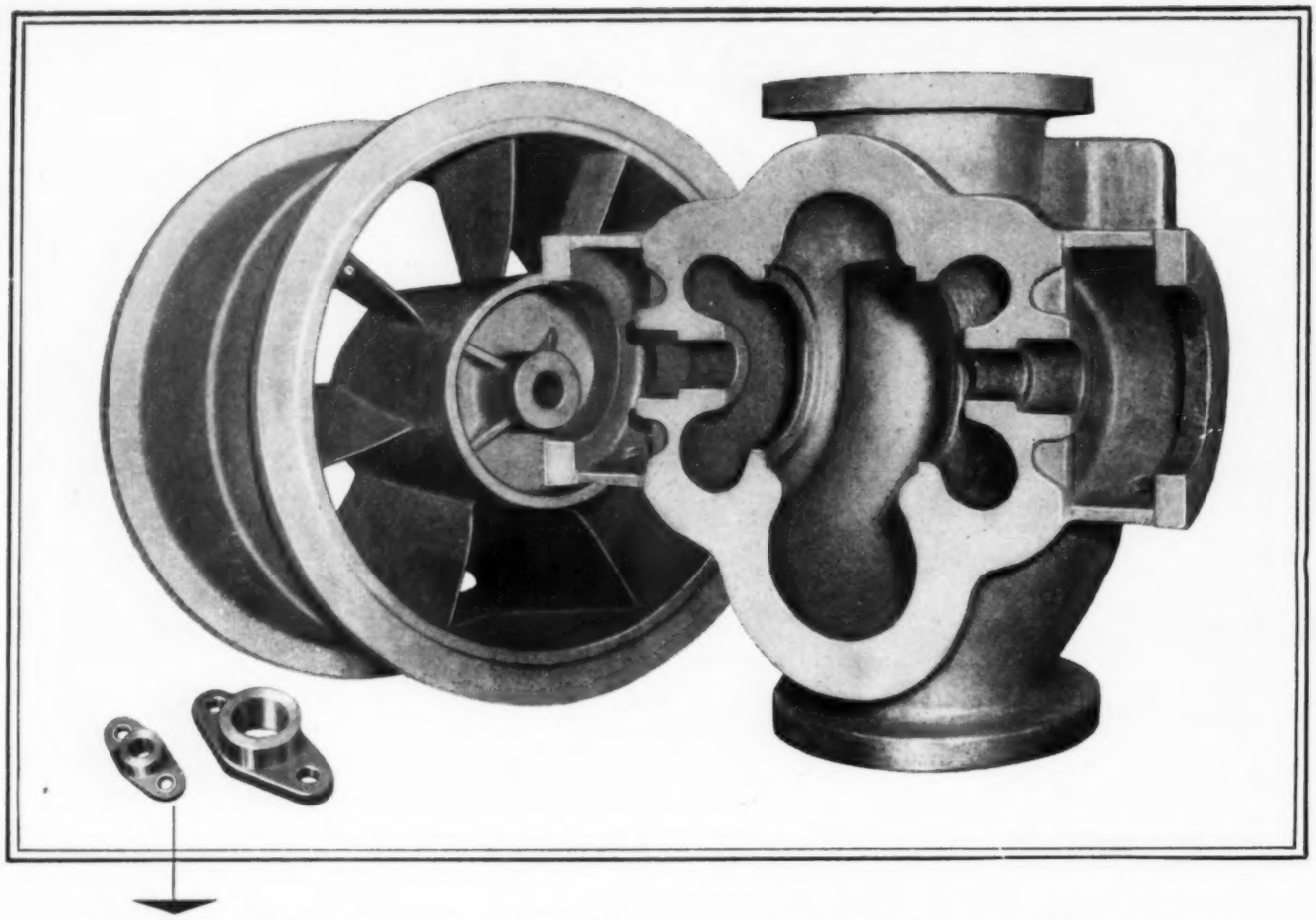


"Custom-Engineered" Castings — for Long Range Economy

For longer, more economical service, N-B-M non-ferrous structural castings are tailor-made to your own specific application

Seldom are two structural casting problems precisely the same. A pump housing, for instance, presents certain requirements, while an impeller may call for a completely different alloy and casting technique.

Because of these innumerable combinations, N-B-M engineers make a specialty of research and manufacturing development — an approach that in the last 74 years has built up a tremendous backlog of experience in solving the most complex problems of casting design.

The unique engineering service of National Bearing Division includes a complete study of the important factors involved in each casting application. The unvarying result of this N-B-M service is to find the answers to such problems as:

The Proper Alloy—for long, trouble-free service and increased resistance to corrosion.

The Proper Casting Design—for a high factor of strength to handle safely the projected loads, pressures and stresses.

The Proper Casting Technique—for close tolerances consistent with maximum economy and ease of finished machining operations.

Any successful application of a structural part—large or small — depends on the correct solution to these basic problems of design. Let the specialized approach and broad experience of National Bearing Division find the right answers for you.

N B M

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

4930 Manchester Avenue • St. Louis 10, Mo.

PLANTS IN: ST. LOUIS, MO. • MEADVILLE, PA. • NILES, OHIO • PORTSMOUTH, VA. • ST. PAUL, MINN. • CHICAGO, ILL.

HOW YOU PROFIT BY *Centrifuging* FACTORY OILS...

KIND OF OIL	DE LAVAL CENTRIFUGAL OIL PURIFIER removes	RESULT
CUTTING OIL	Grit Metallic Particles Water	Oil can safely be re-used indefinitely Less dermatitis Increases tool life
DRAWING OIL	Scale Metallic Particles	Saves wear on dies
GRINDING COOLANT	Abrasive Particles Metallic Particles	Saves wheel dressing time Better finishes in less time Likelihood of distorting work decreased
HONING OIL	Abrasive Particles Metallic Particles	Reduces rejects Insures mirrorlike finish
HYDRAULIC OIL BALER OIL	Condensate Solid Impurities	Eliminates rust Saves pumps and control mechanisms Valve sticking minimized Prevents hardening of leather seals
RUN-IN TEST OIL	Metallic Particles Core Sand	Tests are more reliable Oil can be re-used indefinitely with perfect safety
QUENCHING OIL	Scale and Dirt Carbon Water	Increases oil life Eliminates "soft-spots" due to moisture
SHOCK ABSORBER OIL	Metallic Particles Dirt Solid Impurities	Prevents particles causing piston wear Assures correct cushion
SLUSHING COMPOUND	Dirt Dust	Rust-preventing compound can give full measure of protection
WASHING OIL	Metallic Particles Dust Dirt	Prevents work being scored

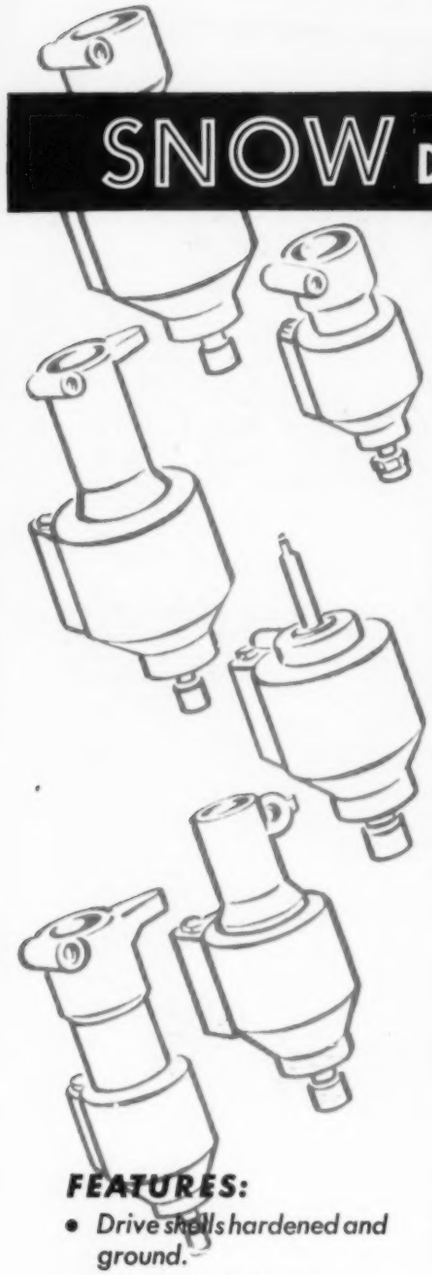
DE LAVAL

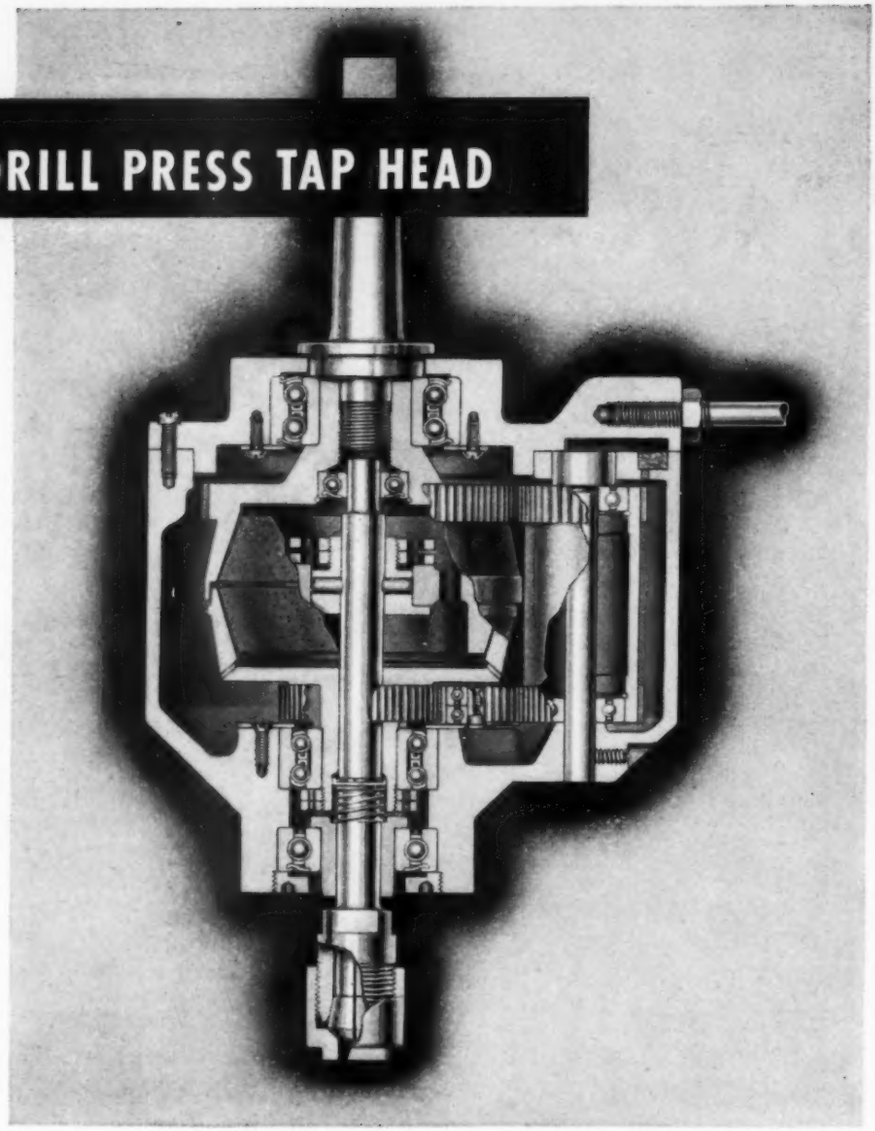
PURIFIERS and CLARIFIERS FOR FACTORY OILS

THE DE LAVAL SEPARATOR COMPANY
165 Broadway, New York 6 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

for greater operating efficiency—

SNOW DRILL PRESS TAP HEAD





FEATURES:

- *Drive shells hardened and ground.*
- *Spindle in balance.*
- *Light weight clutch*
- *Spindle bushing revolves with bearing.*
- *No lateral float.*
- *Collets ground throughout.*
- *Eight ball bearings.*
- *2:1 reverse speed.*
- *Hardened alloy gears and studs.*
- *Delivery from stock.*

The SNOW Drill Press Tap Head is the same unit as used on the SNOW Full Universal Tapping Machines. It is the only Tap Head designed and manufactured for a machine tool by a machine tool builder.

Engineers and mechanics will recognize the rigid, sturdy construction; and operators will vouch for length of service, ease of operation, and quality of work produced.

Eighteen years of production testing, and thousands of installations have proven the advantages of using a precision built drill press tap head.

These units are avilable in three sizes—0 through ¼"; No. 6 through ⅜"; and No. 10 through ½"—both Morse taper and quill clamp styles are in stock.

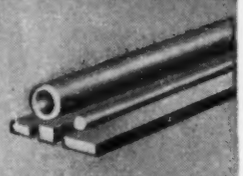
SNOW MANUFACTURING COMPANY

437 EASTERN AVE., BELLWOOD, ILL. • SUBURB OF CHICAGO

TO YOU IN * 24 HOURS OR LESS

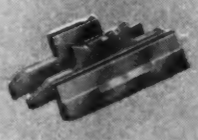
Talide
(TUNGSTEN CARBIDE)
Cutting Tools

TALIDE METAL MEETS EVERY REQUIREMENT



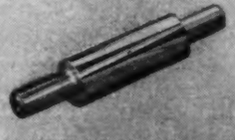
SOLID BAR STOCK

DRAWING DIES



CENTERLESS BLADES

DRILL JIG BUSHINGS



ROLLING MILL WORK ROLLS

Talide Tools reach you in perfect condition. They are plastic dipped for protection in shipment or storage.

Why wait for carbide cutting tools or tips when they are quickly available from a Metal Carbides warehouse. Fast delivery service of Talide (the hardest metal made) is assured by a call to one of the following warehouses:

Newark, N. J., 166 Bloomfield Avenue.
HUmbolt 2-2004
Youngstown, Ohio, 107 E. Indianola Avenue.
Youngstown 2-8167
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Haymarket 1071

Talide QUALITY NEVER VARIES

Metallurgical consistency is a feature of TALIDE tungsten carbide. Talide tools give you 25 times the life of steel tools on every order. *Talide metal lasts longer because quality never varies.*

Send for Engineering-Style Catalog 46-T "STANDARD TALIDE TOOLS and TIPS"

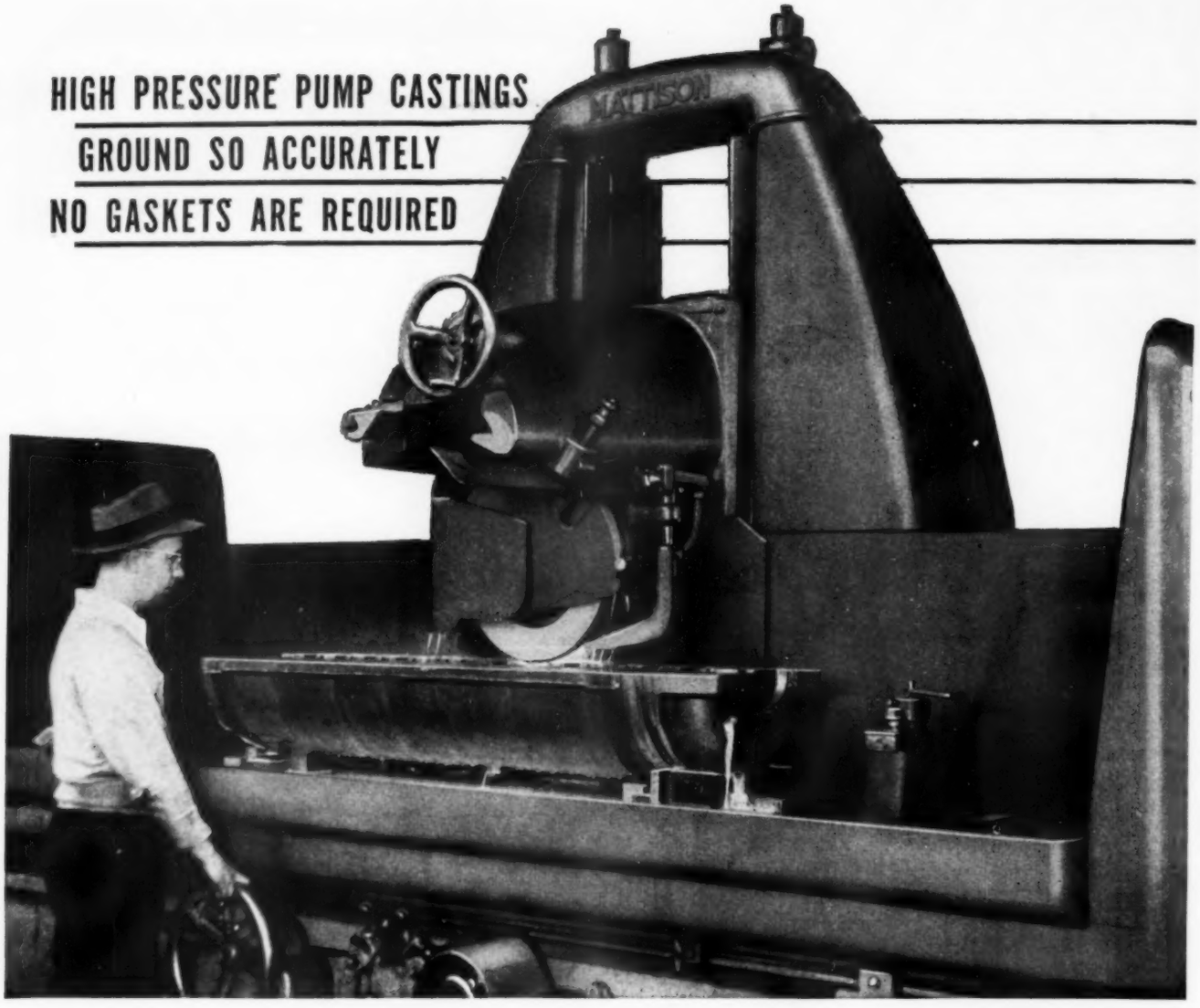
SINTERED CARBIDES — MC TALIDE — HOT PRESSED CARBIDES

METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO *Pioneers in Tungsten Carbide Metallurgy*

CUTTING TOOLS · DRAWING DIES · WEAR RESISTANT PARTS

HIGH PRESSURE PUMP CASTINGS GROUND SO ACCURATELY NO GASKETS ARE REQUIRED



● The above picture shows a 11-13 chrome alloy steel split pump case used on huge boiler feed and hydropress pumps, being finished on a Mattison High-Powered Precision Surface Grinder. It is held to such close limits of accuracy no gaskets are required to effect a complete seal under pressure. .025 to .020 thousandths of stock is removed, with the entire job requiring less than two hours. This includes set-up time and inspection.

● The Byron Jackson Co. of Los Angeles, California, manufacturers of oil field tools, centrifugal pumps and other hydraulic equipment have this to say about their Mattison High-Powered Precision Surface Grinder, "What we are after is finish and flatness, without spending too much time and money — we are regularly improving on this objective."

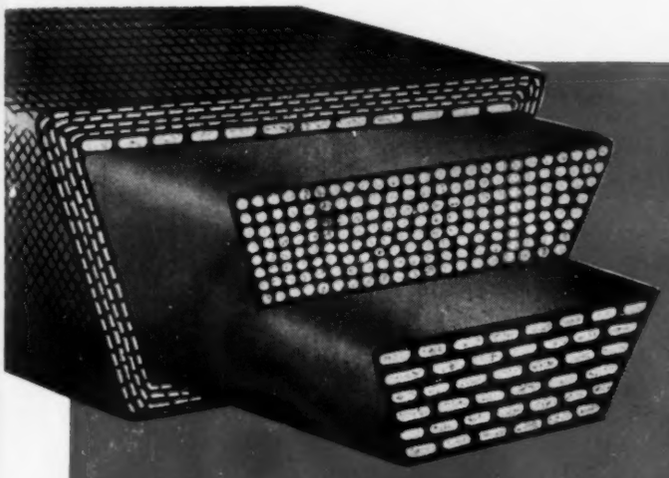
● The job shown is only one of many, the Mattison Grinder handles for Byron Jackson Co. Its vertical and horizontal capacity makes it possible to grind one large part or many small parts, saving time and providing a fine finish and close limits of accuracy.

● Built in a complete range of sizes with table widths from 12" to 36" wide, table lengths from 36" to 192" Mattison Grinders have the capacity, the power, and the speed to efficiently meet your grinding needs. Send us blue prints of your work for production estimates.

Write for Free Set-Up Book showing how others have reduced time and cut costs with Mattison Grinders.

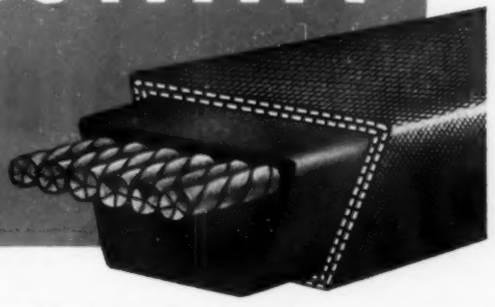
MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS



BULL DOG V-BELTS

HELP THE MANUFACTURING INDUSTRY BUILD GREATER PRODUCTIVITY



In the present postwar rush for greater production, there's a noticeable trend toward bigger machines with higher operating speeds. Thus more work is turned out, and V-Belts have to carry heavier loads and stand more punishment.

Bull Dog V-Belts are designed to meet these present day conditions. They're entirely new — not a rehash of old construction, but a brand new product developed in BWH laboratories to do your job better, for a longer time, at lower cost. Test runs in leading industries prove that Bull Dog V-Belts more than measure up to laboratory predictions of amazingly increased efficiency.

In the short time they've been on the market, Bull Dog V-Belts have won phenomenal acceptance. Here's why:

EXCLUSIVE BWH Bull Dog Cords have greater tensile strength.

EXCLUSIVE BWH Compounds run cool, don't crack, or deteriorate under severe flexing.

EXCLUSIVE BWH Covers of heavy, bias-cut material resist wear, protect against dirt, grease, moisture.

Specify Bull Dog V-Belts on your next installation. You'll be glad you did, when you see maintenance cost sheets and production records!

OTHER FAMOUS BWH PRODUCTS

Rugged BWH Conveyor Belts of all types are winning new laurels throughout industry for their stamina and efficiency. For details, write your BWH distributor.

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all principal cities

PLANT: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

Lebanon and Firth-Vickers join forces ... *to bring you the best in centri-die (centrifugal) permanent mold alloy castings. For heat and corrosion resistant service.*

THE centri-die process of producing centrifugal castings in permanent molds is the most important improvement of a generation of alloy steel foundry progress. Developed by Firth-Vickers of Sheffield, England, before the "Battle of Britain", the unusual design characteristics and integrity of these castings made possible the famous Rolls Royce, De Havilland and other British jet engines.

Now Firth-Vickers has chosen the Lebanon Steel Foundry as its American licensee and correspondent, with full access to all their metallurgical, design and other engineering data. This makes available to American industry the newest techniques of permanent-mold centrifugal casting. By this process tubular and cylindrical structures can be made out of alloys which are difficult or impossible to forge or cast by any other method. For us and our customers it virtually wipes out years of costly experimentation. An addition to our foundry at Lebanon has just been completed and we are now producing centri-die alloy castings of known characteristics and assured integrity.

LEBANON STEEL FOUNDRY • LEBANON, PA.

"In The Lebanon Valley"

LEBANON ALLOY AND STEEL **Castings**

CIRCLE L

HIGHLIGHTS OF LEBANON PROGRESS

1911

Company organized.

1915

Herault furnace installed, one of the first electric furnaces in the U.S.

1926

Production of alloy steel castings began

1930

Ajax high frequency induction furnaces installed. The first used in this country for producing alloy castings.

1933

Lebanon becomes exclusive American licensee of George Fischer, Ltd., Schauffhausen, Switzerland. Swiss Chamotte method first used in America in producing alloy and carbon steel castings.

1948

Lebanon and Firth-Vickers Stainless Steel Ltd. sign agreement, making available to American buyers of heat and corrosion alloy castings all the experience and methods developed by the largest producer of such castings in Europe.

Get This Book "Centri-die Centrifugal Castings"

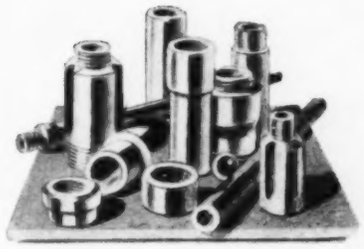
Prepared by Lebanon and Firth-Vickers engineers to explain fully the practical advantages of the centri-die process of making alloy castings centrifugally in permanent molds. While it has been written primarily for the design and metallurgical engineer, it also will be of interest to executives who like to keep abreast of new manufacturing and production methods. Write for a copy of Bulletin D.

AXELSON FIRST CHOICE

MANAGEMENT EXECUTIVES AGREE a greater volume of production per man-hour and better quality work at less unit cost, is produced in their machine shops on AXELSON heavy-duty engine lathes.

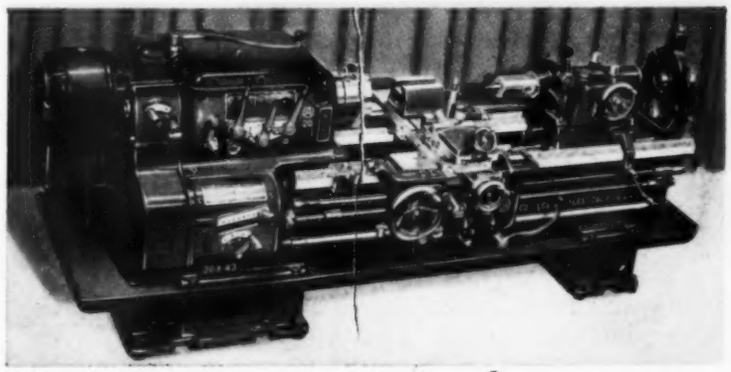
MORE PRODUCTION PER DOLLAR CAPITAL INVESTMENT is assured with AXELSON lathes because of their faster speeds . . . greater ease of operation . . . ample reserve of smooth power at the cutting tool to handle any work without slowdown . . . scientific location of controls to minimize lost motion.

BETTER QUALITY WORK is produced on AXELSON lathes because of their in-built precisioned accuracy . . . extreme rigidity to maintain positive alignment . . . freedom from tool-damaging backlash and chatter.



WIDER RANGE OF APPLICATIONS means fewer machine tools needed to handle the work load . . . two-speed tailstock . . . built-in reverse clutch . . . designed for modern high-speed and carbide-tipped tooling.

LONGER LIFE—LESS MAINTENANCE with AXELSON lathes, cut depreciation and plant overhead . . . reduce to a minimum production shutdowns for maintenance or repair . . . provide years of added precision work at no replacement cost.



THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON *Lathes*

DEPENDABLE FOR A THIRD OF A CENTURY

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Save steel, work and time with DISSTON HOT ROLLED TOOL STEEL SHAPES

Why pay for all this Bar Stock . . 38 oz.

To get this..17 oz. **WHY NOT START HERE!**

To make this Vise Jaw Insert . . 13¾ oz.

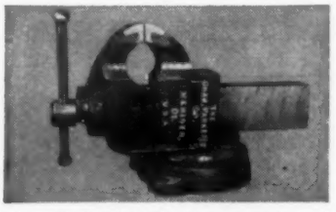
Disston Hot Rolled Shapes can save you up to 50% or more on the tool steel you now use. By using the hot rolled shape shown above the saving in steel amounts to 55.26%. And, even more important, there is a saving in machining time, for these Disston shapes are rolled to close tolerances.

Disston Hot Rolled Shapes are supplied in many forms and sizes . . . in alloy and carbon tool steels . . . in electric and open hearth grades.

Send us dimensional sketches of the shapes you use, together with the analysis and approximate quantities desired. Full particulars will be sent to you promptly.

Disston metallurgists and engineers will be glad to help you solve any of your tool steel problems.

WHEN YOU BUY A DISSTON PRODUCT YOU BUY DISSTON STEEL SKILL and SERVICE



No. 974½ Machinist's Vise, a product of the Charles Parker Co., Meriden, Conn.

ANALYSIS OF STEEL USED

CARBON	.45/.55
MANGANESE	.60/.90
PHOSPHORUS and SULPHUR	.040 max.
SILICON	.20/.35
CHROMIUM	.80/1.10

STEEL: Everybody who wants to obtain steel can help himself to get it by immediately starting scrap into the channels that serve steel mills.

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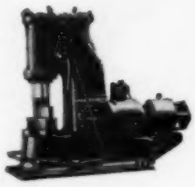
PUT A HAMMER IN YOUR SHOP

IT WILL SAVE YOU TIME AND MONEY—QUICKLY PAY FOR ITSELF



Chambersburg Pneumatic Forging Hammer

A small or moderate size hammer is a great convenience for any shop where machinery repair or maintenance work is carried on. You can save time and money and often make a better repair part than you can buy or make by casting or welding. When you need a replacement part in a hurry, that's where a Chambersburg Hammer will pay for itself. If you have steam or air lines, a Chambersburg Single Frame Hammer will be your logical choice; if not, the Chambersburg Pneumatic with hammer, compressor and motor in the one piece of equipment, will enable you to locate the hammer anywhere in your shop.

Chambersburg Single Frame Hammer (Steam or Air)

HERE'S WHAT A 200 LB. CHAMBERSBURG PNEUMATIC HAMMER IS CAPABLE OF . . .

FORGING A ROD BOSS FROM 4½" x 4½" STOCK

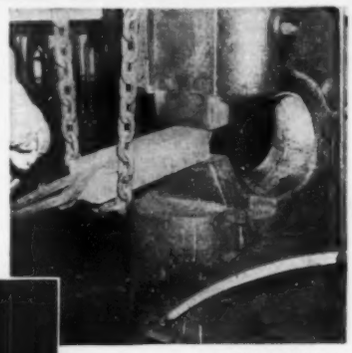
THE START

SHAPING

FINISHING

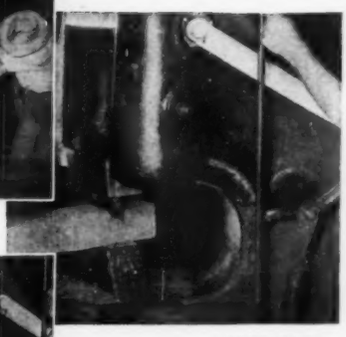
HERE'S WHAT A 400 LB. CHAMBERSBURG SINGLE FRAME STEAM OR AIR HAMMER IS CAPABLE OF . . .

FORGING A WEDGE FROM 6" x 6" STOCK—a job ordinarily assigned to a 2500 lb. hammer—but look what the small hammer can do in an emergency!

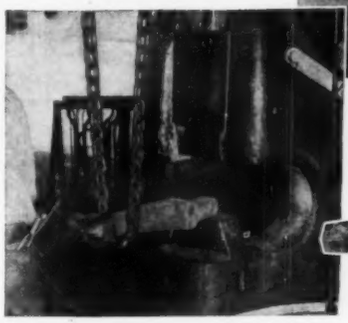


THE START

REDUCING



CUT-OFF



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Gives this TAFT-PEIRCE NO. 1 PRECISION SURFACE GRINDER

Effortless Operation • Unusual Accuracy

The operation of this Taft-Peirce No. 1 Precision Surface Grinder is smooth and effortless because table, saddle and column travel on ball bearings retained in vees of hardened and ground alloy steel.

As a result there is practically no wear on ways and moving parts. Grinding time and wheel wear are sharply reduced. Plane surfaces can be given the highest possible degree of accuracy, flatness and finish.

This and other exclusive features will measurably improve the output, quality and economy of your surface grinding work on parts up to 5″ x 12″ x 12″. For illustrated booklet and prices write: The Taft-Peirce Mfg. Co., Woonsocket, Rhode Island.

THE TAFT-PEIRCE MFG. CO.
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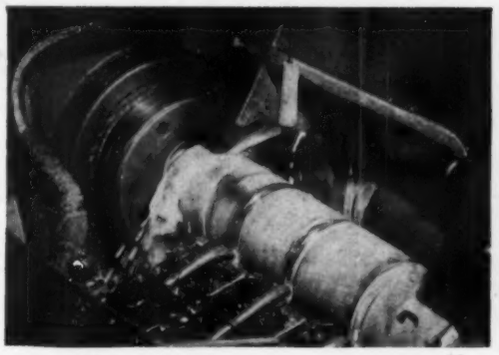
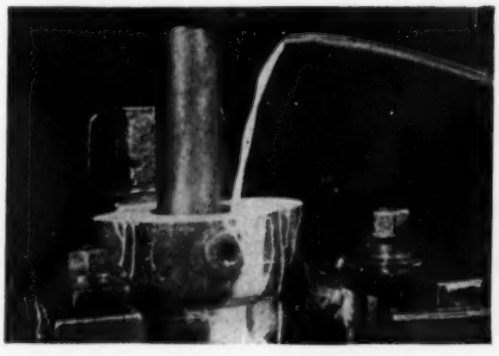
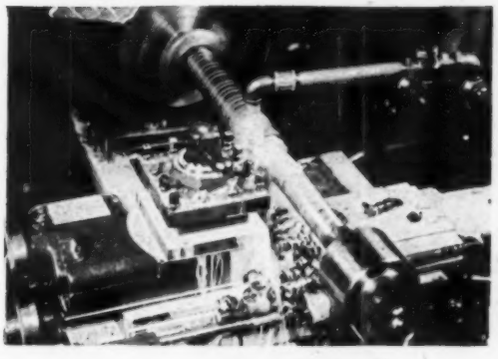
OAKITE SOLUBLE OIL *gives you all* 4 . . .



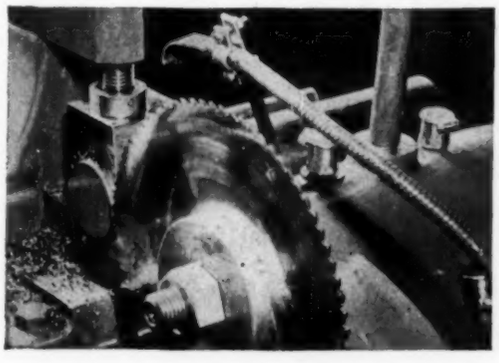
SUPERIOR COOLING Oakite Soluble Oil emulsions rapidly carry off heat. By reducing friction, Oakite emulsions reduce heat; keep work and dies cooler; minimize draw on temper of tool; lessen distortion of work.



BEST LUBRICATION Adequate lubrication of Oakite Soluble Oil acts as a protective cushion in your machining operations. Highly refined Oakite Soluble Oil forms stable lubrication emulsions. Boring (above) depends on such lubrication.



LONG SOLUTION LIFE Emulsions of Oakite Soluble Oil stay workable longer because special ingredients help ward off solution rancidity. That means less danger of dermatitis.



CLEAN CUTTING Rugged cold sawing operations like the one shown above, require the ultimate in cooling and lubrication that Oakite Soluble Oil gives to help your saw make straight, sure cuts.

. . . plus economy!

Make no mistake about it. Oakite Soluble Oil is economical to use because of its high dilution ratio. Add the fact that Oakite emulsions prevent rust, and you have the perfect coolant for all your machining operations. Your local Oakite Technical Service Representative will gladly supply specific formulae designed to give you peak cooling and lubrication for your specific jobs. Contact him today or send for free booklet which outlines formulae.

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Designed and Built to help you SPEED UP PRODUCTION

HERE'S help for manufacturers who want to speed up production on light stamping, press fit assembling, marking, die cutting, and similar operations. Take advantage of the opportunities offered by Hannifin's new high speed, air operated presses!

TWO MODELS: Model M-1 has 6" gap, develops 1270 lbs. ram pressure with 80 lbs. air. Model M-2 has 12¼" gap and 2650 lbs. capacity. Both moderately priced.

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KEYSEATING The Modern Way

Illustration shows typical set-up for cutting taper keyway with table tilted.

Machines are made in three sizes for keyways 1/16" to 1¼" in width.

Great simplicity and ease of operation of Davis Keyseaters assure the user of accurate, time saving work.

Let our engineer study your keyseating problems.

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How to cut assembly costs

Composition board and impregnated fibreboard are being fastened together with the Acme-Morrison Metal Stitcher. A steel support is also stitched to this assembly.

Manufacturers report real savings with the ACME-MORRISON Metal Stitcher

See demonstration in Booth No. 737, Metal Show, Philadelphia, October 25-29.

In a single operation the Acme-Morrison Metal Stitcher fastens both metal and nonmetallic materials.

This money-saving machine forms its own stitch (or staple), drives it through the material and clinches it. No pre-punching is required. The sturdy metal stitches replace rivets, screws, nails, bolts, and spot welding.

A maker of insecticide spray guns reduced his labor costs 38 per cent and cut material costs 91 per cent.

Another company saved "approximately two minutes' assembly labor per ladder over the old method of bolting; a saving of the cost of four screws, nuts and washers; and an increase in the strength and rigidity of the joint."

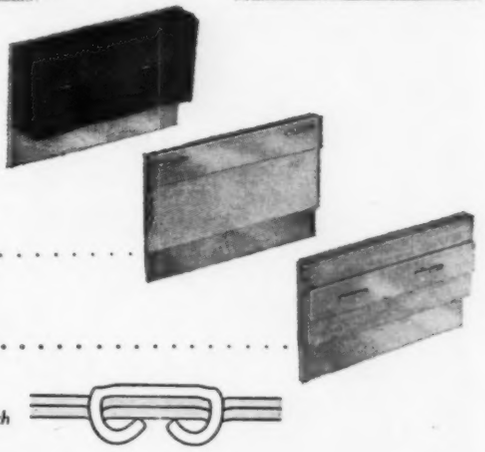
Acme-Morrison Metal Stitchers are made in several models. Why not find out what these time and money-saving machines can do for your business? Mail the coupon today.

STITCHING WIRE DIVISION

ACME STEEL COMPANY

NEW YORK 17 ATLANTA CHICAGO 8 LOS ANGELES 11

A few of many combinations



Textile stitched to aluminum . . . . . .

Aluminum, leather, and copper stitched together . . . . . .

Aluminum, plywood, and brass stitched together . . . . . .

Cross-section view of a stitch

ACME STEEL COMPANY, Dept. AM-108
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Gentlemen:
Please send me further details about the Metal Stitcher.

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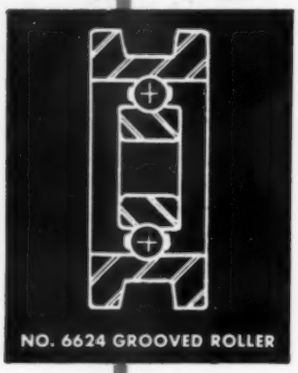
Specialists in "Specials"

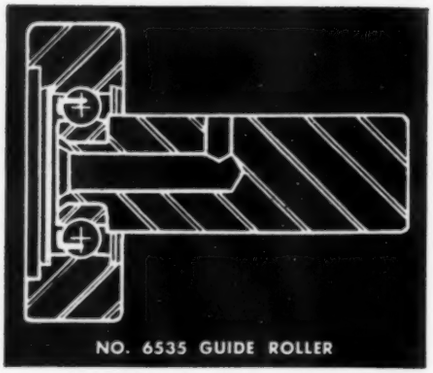
Especially designed to be "exactly right" for specific applications, thousands of "special" NICE Ball Bearings are assembled daily into hundreds of products, and their use results in substantial savings and advantages to both manufacturer and consumer, such as:

- ***elimination of component parts***
- ***lower initial costs of bearing assembly***
- ***lower cost of production***
- ***improved appearance***
- ***improved performance***

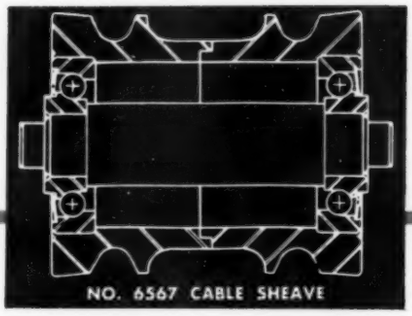
Consideration of these advantages is recommended especially to product engineers and manufacturers using production quantities of bearings, and a few typical NICE "specials" are illustrated.



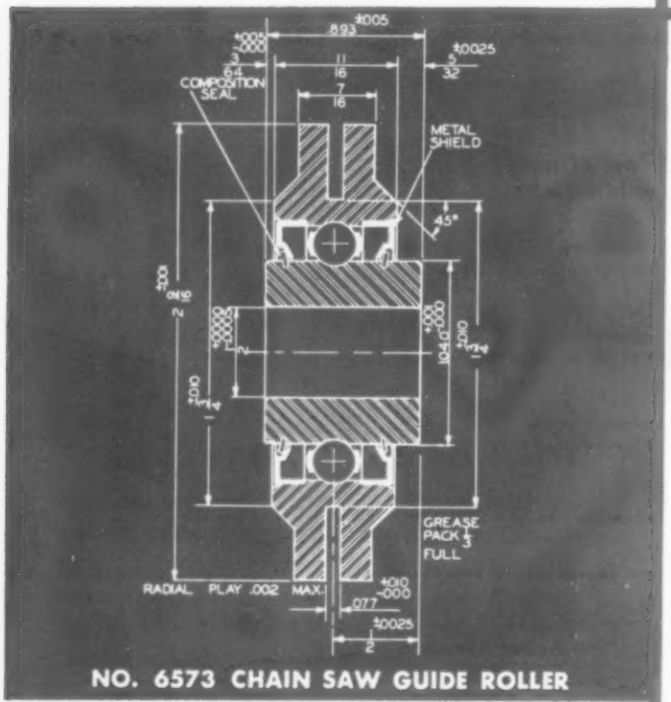
NO. 6624 GROOVED ROLLER



NO. 6535 GUIDE ROLLER



NO. 6567 CABLE SHEAVE



NO. 6573 CHAIN SAW GUIDE ROLLER

Representative of NICE ingenuity is No. 6573, a chain saw guide roller.

Produced for a large manufacturer of power driven chain saws, No. 6573 replaces an expensively machined shaft or axle, a hardened and ground outer tire, a double row ball bearing, two nuts and two lock washers. A standard nut and bolt is used for mounting this one-piece unit, and although completely interchangeable, the over-all cost is now only about one-half that of the original multi-part assembly.

It is important to note that the composition grease sealed construction (patent pending) of No. 6573 provides greatly improved protection from dirt, grit and sawdust on a job where operating conditions are exceptionally bad.

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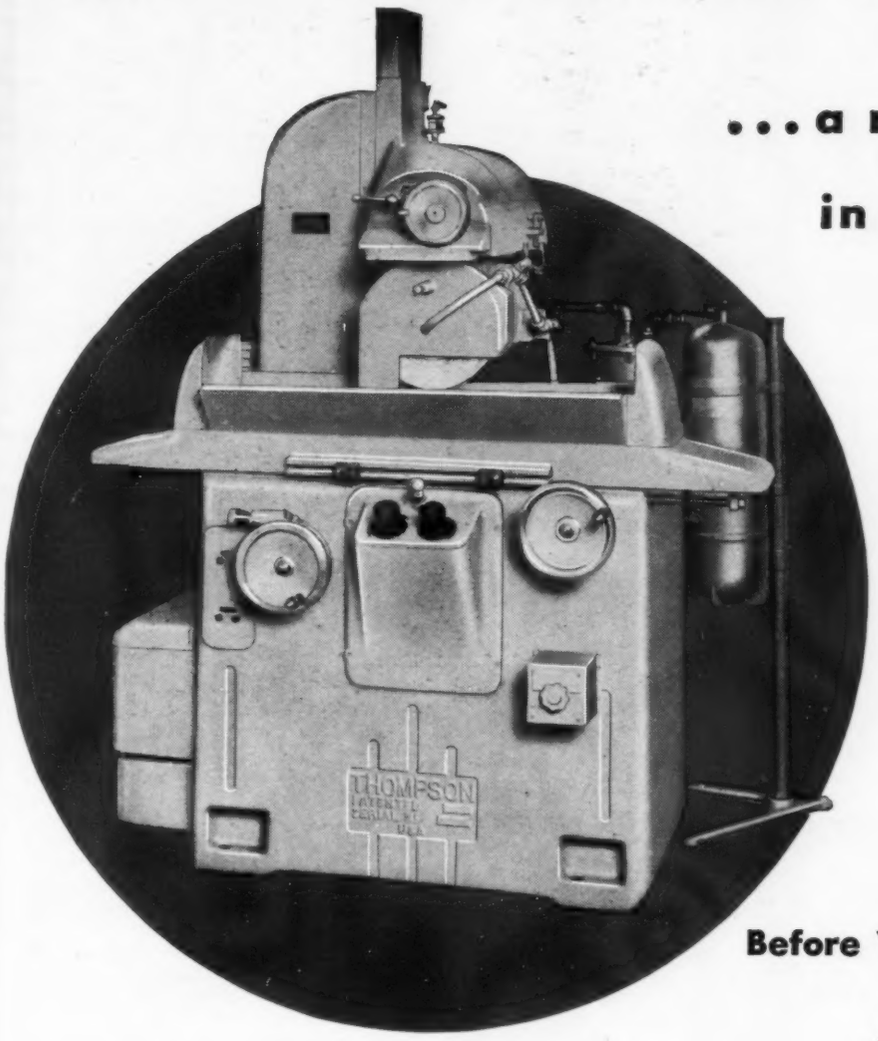
GREATLY IMPROVES GRINDING METHODS



...a new development in surface grinding by THOMPSON

Now you can grind very thin sections without burning and warpage.

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Thompson provides a full range of machine sizes from 6" x 18" to 36" x 240" utilizing the new principle of applying coolant to the grinding wheel. The new Thompson Type "F" Hydraulic Surface Grinder with coolant through the wheel is shown above. All of the coolant is applied through the grinding wheel, making it possible to grind exceedingly thin sections without burning or warping the work.

Very fine finishes are obtained to extremely close dimensions. An outstanding advantage of this patented process is gained in grinding blanking dies and other metal cutting or shearing tools. No amorphus metal is present after grinding. This increases the life of the tool between grinds.

WRITE TODAY **for details of this new process and for information on ways it can save you production time and money! Address Dept. 10, The Thompson Grinder Company, Springfield, Ohio.**

SEE OUR NEW 32 PAGE CATALOG IN SWEETS, OR WRITE FOR COPY.

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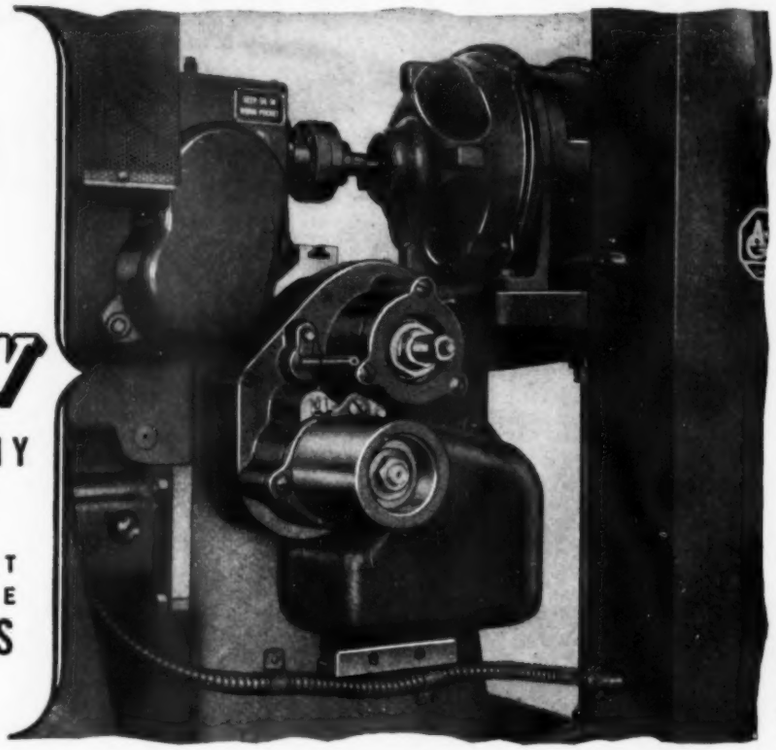

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER on Your Work

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, and offset holes. We also manufacture oil-grooving millers.

WRITE today for Catalog No. 16

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

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Simply invest in HOVIS UNIVERSAL MASTER WASHER DIES. Then 5 small easily removable parts are all you need to change to make a new size washer.

• You can also use the Hovis Master Washer Die as a holder for making various blanks in your own die room, eliminating the cost of new die sets

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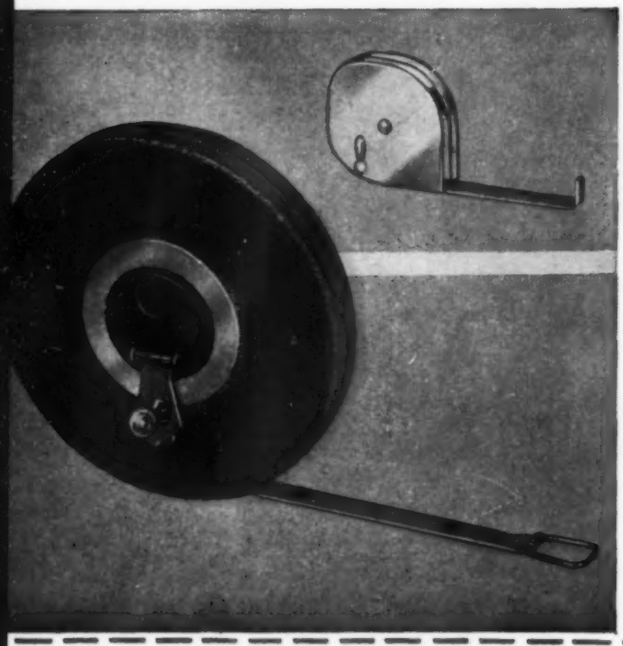

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BAYFLEX® is worth discovering too!

Columbus' discovery proved to be one of the most valuable discoveries in history . . . and *Bayflex Raised Hub Disc Wheels* have proved to be a remarkable "find" too, by foundries, welding shops, metal fabricating shops, automobile and truck body repair shops, for removing unwanted metal *faster — easier — cleaner*. Operators are pleasingly surprised with production possibilities and their increased piece-work earnings.

Bayflex discs 1/8" and thicker are made of multi-layers of cotton fiber loaded with sharp abrasive grit — flexible yet extremely strong — can be used for edge as well as surface cutting giving "40 to 1" life, and more, over conventional discs.

Words cannot fully describe this new wheel, you must see it in operation. Send coupon today for a demonstration.

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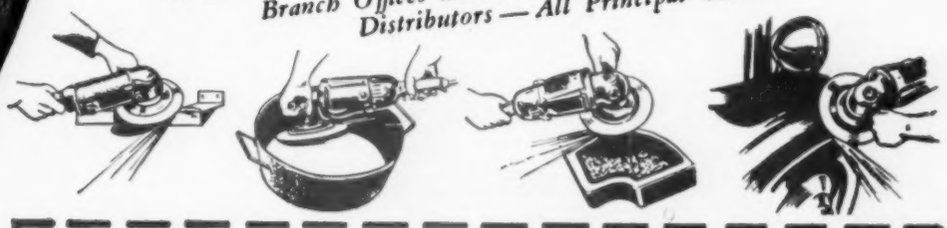

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Please have your representative call just as soon as possible to demonstrate Bayflex Raised Hub Disc Wheels. It is understood that this will not obligate us in any way.

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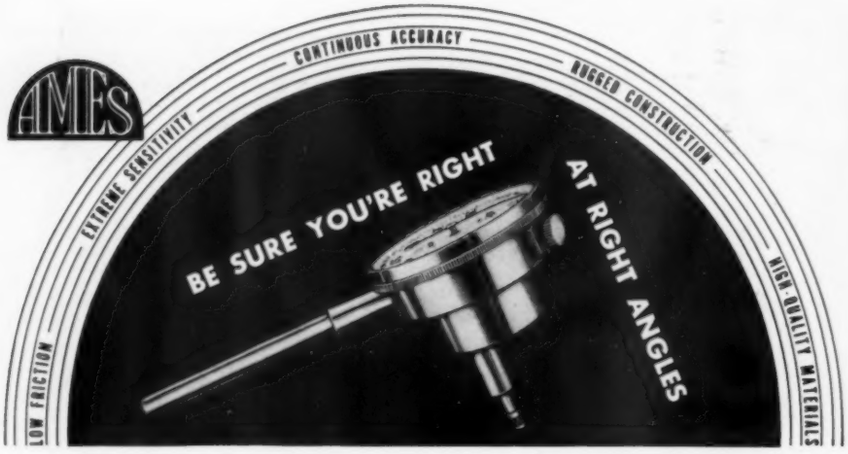
City..... State.....

Individual.....



Use AMES Horizontal Indicators

The highly accurate, highly sensitive Ames Horizontal is the right indicator for right-angle readings. It is invaluable for tool room and production jobs where it is advantageous to have the dial in a horizontal plane, and on work surfaces where the use of regular indicators is impractical.

The Ames Horizontal is designed with the usual Ames approach of *sustained accuracy through simplicity.* Action is obtained through a rack and pinion—there are no spirals, cams or levers which might introduce wear and incorrect dial readings. Because of its sturdy, forged brass construction, any surface of the case may be used for mounting—or the regularly supplied holding rod may be used.

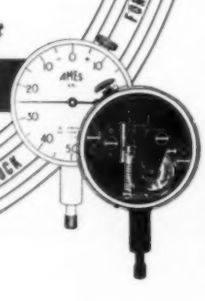
Be sure you're right at right angles, specify Ames Horizontals. Write for new bulletins describing all sizes and models of this modern gauge.

A Universal or Hole Attachment may be clamped to the stem of the Ames Horizontal. It will check holes, stationary or revolving, up to 1¾" deep. This Ames attachment is a favorite for speeding up the performance and accuracy of service and maintenance work.

Address inquiries to Home Office, 26 Ames Street

B. C. AMES CO. *Waltham 54, Mass.*

MANUFACTURER OF MICROMETER DIAL GAUGES
AND MICROMETER DIAL INDICATORS
Representatives in principal cities



HARDENED STEEL GUIDEPIN AND BLOCK • FORGED BRASS CASE AND STEM • FORGED WHEEL SUPPORTS • PRECISION HARDENED BEARINGS

TODAY'S METAL CUTTING REQUIRES GOOD CUTTING FLUID

. . . says

"CHIP" WRIGHT

Material shortages and other unusual conditions of this post war period emphasize the need for sound cutting fluid practices. Uncontrollable changes in material quality necessitate substitution . . . calling for cutting fluids with wide latitudes and broad tolerances. When you are faced with such machining problems, the smart thing is to use the "know-how" of established cutting oil people. They have the broad, practical experience based on many years of solving difficult machining problems, and the technical knowledge and facilities to apply it to your job.

Chip

An Economical Solution

SUPERKOOL

Base Cutting Oil

SuperKool Base Cutting Oil is available already correctly mixed for your convenience. Eliminating on-the-job mixing makes possible worthwhile economies in time, labor and money. For recommendations of SuperKool mixes, consult a Stuart service engineer.

Another Time-Tested Stuart Product

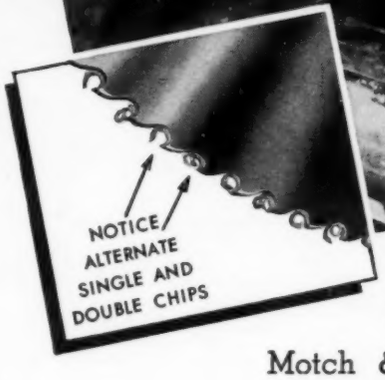
D. A. Stuart Oil Co.

2729 SOUTH TROY STREET, CHICAGO 23, ILL.

More POWER to your Blades!

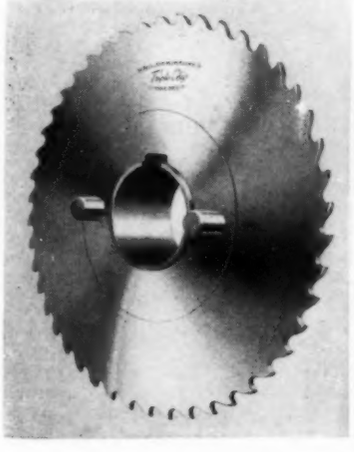
Motch & Merryweather Triple-Chip SLITTING SAWS and DUAL DRIVE ADAPTORS insure more profitable slotting production.

Triple-Chip METHOD



• MORE POWER • HIGHER PRODUCTION • LOWER COSTS • LESS BREAKAGE

Motch & Merryweather Slitting Saws have an exclusive dual drive feature through which balanced power is transmitted, eliminating the stresses which cause breakage. A broad, flat hub affords plenty of surface contact for rigid holding, which balks tooth weaving tendencies. Accurate slotting results. Our exclusive Triple-Chip tooth form breaks up and distributes the cutting load, permitting heavier feeds. Deep gullets increase blade strergth and produce curling, self-ejecting chips (no clogging). You need fewer blades, since M. & M.'s exclusive adaptors fit many arbor sizes. Three standard tooth spacings in every diameter and thickness aid the cutting of thick or thin sections.



M. & M.'s exclusive dual drive delivers more power to the blade without danger to the driving means. Ample side clearance is ground into the blade down to the broad hub. Standard dual drive adaptors are designed with ample keyway to more than satisfy tough cutting requirements.

Write for our Bulletin "A-10"

SEE OUR EXHIBIT AT A. S. M. EXPOSITION, PHILADELPHIA, OCTOBER 25-29

THE MOTCH & MERRYWEATHER MACHINERY CO.
PENTON BUILDING • CLEVELAND 13, OHIO

CUTTING TOOL DIVISION

AT YOUR COMMAND • AN UNPARALLELED EXPERIENCE IN CIRCULAR SAWING

Are You Paying Too Much for Precision?

You can cut labor costs, reduce scrap, and maintain closer tolerances with the

NEW AO OPTICAL PROJECTION COMPARATOR

Here is an instrument so advanced in accuracy and convenience that it opens new possibilities for optical projection comparison in parts inspection and tool and gage measurement. Developed by one of America's most respected builders of scientific optical instruments, the AO Comparator offers many long-sought features:

The basic AO Comparator speeds inspection of parts on the production line. For mounting on a bench, it is available without the portable base.

For further information, write Dept. K-157.

Uniform Magnification Without Distortion
for unequalled measuring accuracy.

Greatly Increased Illumination
valuable advantage at all magnifications.

Coated Precision Optics
for crisp definition, brilliant image contrast.

Cool, Sturdy Lamphouse
Forced ventilation throws heat down away from operator.

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Objectives quickly interchangeable without adjustment.

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No adjustments needed.

Bulb—High Intensity, Prefocused and Precentered,
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Light Weight Cast Aluminum
Easily moved on retractable casters.

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Rapid fingertip focusing, with 4" vertical travel.

American Optical
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Buffalo 15, New York

Manufacturers of the **SPENCER** *Scientific Instruments*

FOR SUSTAINED ACCURACY...

Staples

CARBIDE-TIPPED STUB SCREW MACHINE REAMERS

Machine the full run of the part, maintain high accuracy, eliminate frequent down time for reamer re-sharpening, with Staples carbide-tipped Stub Screw Machine Reamers. A complete range of sizes is available for quick delivery. Tools are stocked semi-finished and are ground to decimal sizes specified, with tolerance of .0003" on diameter.

Staples patented Expansion Stub Reamers provide exceptional economy. Tool body is *solid*, not split. To compensate for wear, simply drive in tapered plug and expand tool back to original diameter. Plug has taper of .020" per inch, permitting easy adjustment to .0001". Plug contacts tool body well beyond rear of tips, assuring uniform parallel expansion the full tip length. Cutting blades remain perfectly concentric.

Expansion plug is limited to 3/32" extension beyond tool end. Can be supplied with plug flush with tool end. Reamer can be expanded several times without regrinding, without affecting hole finish, enabling you to hold accurate sizes with a minimum of tool servicing.

THE STAPLES TOOL CO.
CINCINNATI 25 OHIO

Distributors in Major Cities

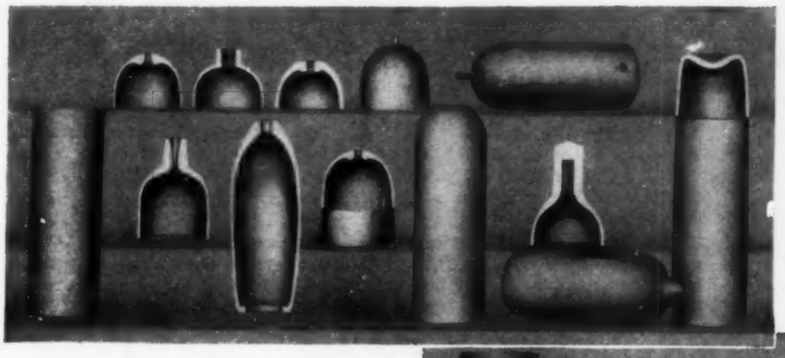
Complete tool catalog supplied on request

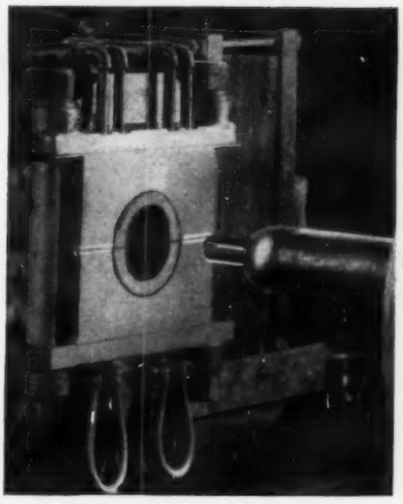
Manufacturers of a complete line of carbide-tipped single and multiple point cutting tools • Expansion Reamers • Form Tools • Centers • Masonry Drills • Special Tools

Federal

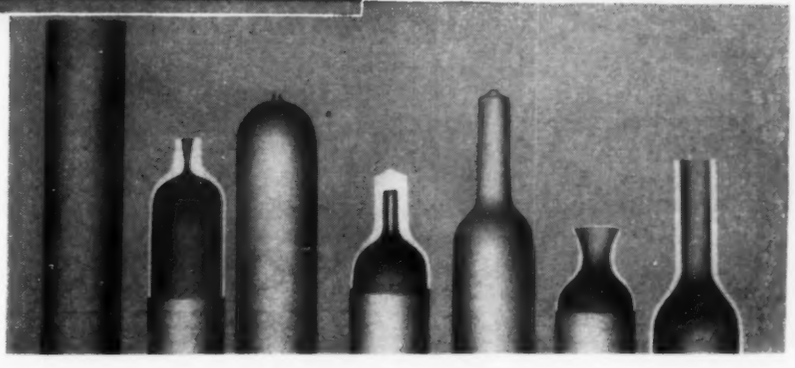
announces

"THE WESTIN PROCESS"





PATENTED



HERE'S a really new way to form tubular sections. Far more efficient than conventional methods in use today, the revolutionary Westin Process is performed by a combination of electrical current and pressure. Its application means considerable savings in time and material, and a greatly improved product quality.

Developed to enable manufacturers to achieve lower unit cost of production, this new process is particularly adaptable to forming steel gas cylinders, upsetting sections of tubing to increase wall thickness, sealing tube ends, necking-down tube sections and performing other high-production operations of a related nature on low carbon, alloy steel, brass and other metals.

The Westin Process is one more example of how Federal is making every effort to reduce costs and increase production and quality in the metal working field.

When forming tubular sections, it will pay to look into the Westin Process. The illustrations on this page are intended only to set you to thinking about your own production. It costs nothing to inquire.

Federal is equipped to handle every type of metal forming or resistance welding application. Let our engineers analyze your product and show you new economies in your press and welding operations.

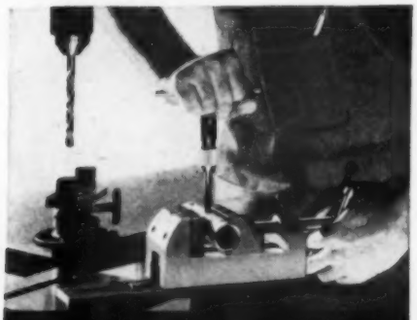
Federal WELDERS

Warco PRESSES

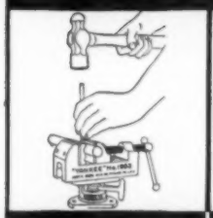
RESISTANCE WELDERS FOR EVERY APPLICATION
FROM 50-TON OBI TO 2000-TON DOUBLE ACTION

THE FEDERAL MACHINE AND WELDER COMPANY
Dept. 198, Plant 2, Warren, Ohio • • *Offices in Principal Cities*

SPEED UP SMALL JOBS with "YANKEE" VISES



"Yankee" 1993 Vise, removed from swivel base and held by "Yankee" Vise Clamp for drilling and tapping.



Bench-mounted on quick-release swivel base.

Machine-mounted with "Yankee" Clamp.

Sides, bottom and front end accurately machined.

Vise lifts on and off swivel base.

Line up small work just once in a "Yankee" Vise for a whole series of hand and machine operations. Four sizes . . . 1½", 2", 2¾" and 4" jaw widths . . . with and without swivel base. Hardened steel "V" block for round stock. Your industrial distributor has a full stock.

Write for The "YANKEE" Tool Book

"Yankee" Tools now part of

STANLEY

THE TOOL BOX OF THE WORLD

NORTH BROS. MFG. CO.
Philadelphia 33, Pa.

GREATER PRODUCTION insures LOWER COSTS

with the

KALAMAZOO METAL-CUTTING BAND SAW

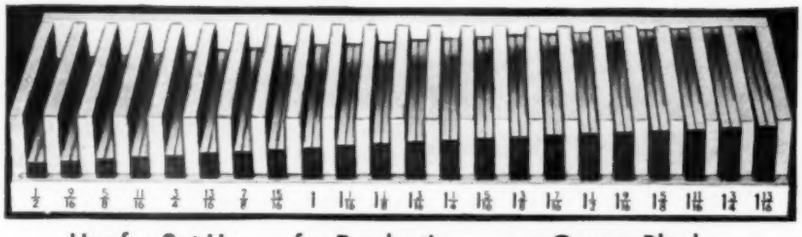
When you have a big job of cutting whether it is bars, angles, channels, tubes or odd shapes, it is almost certain that the Kalamazoo Band Saw can do it for you FASTER and more accurately.

The amazing production is due to continuous cutting action, quick set-up and high speed.

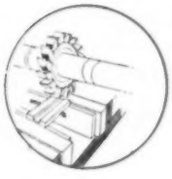
The coolant model (illustrated) is ideal for continuous production. Without the coolant it is a big time and labor saver on short runs. Portable—plugs in anywhere. Automatic in operation. A lot of production for a small investment.

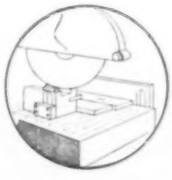
MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY
KALAMAZOO 16, MICHIGAN

announcing the NEW ANTON .0001 'PRECISION' PARALLELS . . .



Use for Set Up . . . for Production . . . as Gauge Blocks





Anton "Precision" Parallels, furnished in a complete range of sizes, are guaranteed to "tenths" in size and parallelism and in straightness, are permanently accurate and have a Rockwell "C" hardness 65 up. They meet all requirements for tool room or production. Accuracy allows use as gauge blocks for measurements in thousandths. The following sets are now available:

22 pairs, ¼" thick x 6" long, ½" to 1-13/16" in 1/16" steps ..... Price $124.00

11 Pairs , ½" thick x 6" long, 1-3/16" to 1-13/16" in 1/16" steps ..... $ 92.00

11 pairs, ¾" thick x 6" long, 1-3/16" to 1-13/16" in 1/16" steps $115.00

All prices F.O.B. New York and include boxing of each set in a convenient wooden case.

Anton Standard Parallels to commercial tolerances also available.

ANTON MACHINE WORKS 52 SANDS ST. BROOKLYN, N. Y.

Specialists in Precision Since 1929

Operator's Hands Left Free for Other Work...

...EXCLUSIVE PISTON LATCH* PERMITS

Dual Control FROM ONE TREADLE

IN NEW "LOGAN" † STANDARD *Foot Operated* VALVES

(AIR AND HYDRAULIC MODELS; 4-WAY, 2-POSITION TYPE)

To elevate these heavy castings in position for the conveyor, the operator momentarily presses the treadle of the Logan foot valve controlling the pneumatic mechanism. With the valve piston latch set for *indefinite dwell,* the elevating cylinder is held at the end of the outstroke until a conveyor hook can be attached to the part. The operator then presses the pedal again to lower the platform for receiving the next workpiece.

Conventional operation may be obtained from the same valve treadle by turning the lever to place the latching mechanism in neutral. The exclusive piston latch is available in Logan foot operated valves of both air and hydraulic types. Additional advantages are as follows:

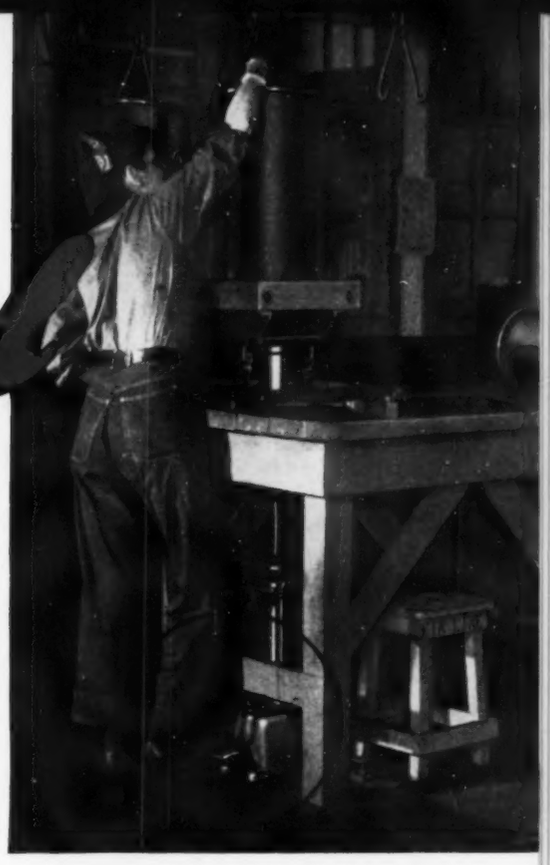
HIGHLY COMPACT—Only minimum floor space required. Valve bases range from 5 in. to 10 in. square—heights from 6¾ in. to 11¼ in.

EFFORTLESS FOOT CONTROL—Balanced piston design—valve does not operate against line pressure.

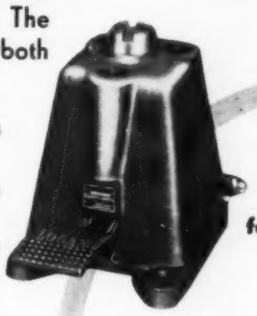
FAST, POSITIVE ACTION—Valve ports and internal chambers are full pipe size; piston is light in weight. This assures rapid response and fast reversals without excessive vibration or wear.

INFREQUENT MAINTENANCE—No valve seats to become worn. *Air valves* have long-life synthetic cup packings (no rod packing). *Hydraulic valves* have no packing except stem seals, subject only to exhaust pressure.

** Design Reg. U.S. Pat. Off.* *† Trade Mark Registered*



Operator fatigue is minimized and the operator's hands left free for work requiring manual skill by using a Logan foot operated control valve.



Model 6520 AIR Control Valve for pressures to 150 p.s.i.

Model 7025 HYDRAULIC Control Valve for pressures to 1500 p.s.i.

LATCHING CONTROL (Indefinite Dwell)

With latch lever *turned forward,* valve piston is shifted and *latched* when pedal is pressed, starting the cylinder outstroke. Operator can then release pressure of his foot—line pressure continues to be directed to desired end of cylinder, providing *indefinite dwell* at end of movement. When pedal is pressed *a second time,* latch releases and valve piston returns by spring load to normal position, reversing cylinder movement and providing indefinite dwell until cycle is re-started.

2 DISTINCT TYPES of CONTROL

INSTANT RELEASE (Spring Return)

With latch lever *turned back,* latching mechanism is thrown into neutral. Valve piston is shifted when pedal is depressed, and returns to normal position by spring load *as soon as foot pressure is released.* Thus pressing the pedal initiates the cylinder outstroke—releasing it will reverse cylinder movement.

FREE CATALOGS—AIR VALVE Catalog 90; HYDRAULIC VALVE Catalog 85. Write for your copies now!

Logan

SAVES ★TIME ★EFFORT ★MOTION

Air and Hydraulic Equipment

LOGANSPORT MACHINE CO., INC.

918 CENTER AVE. LOGANSPORT INDIANA

CHUCKS • CYLINDERS • VALVES • PRESSES • SURE-FLOW COOLANT PUMPS

What Every Operator Knows

THE OLIVER ACE MAKES CUTTER GRINDING EASY

Accuracy in tool sharpening helps production all along the line. Make your toolroom production-wise by installing an Oliver Ace Cutter Grinder, choice of operators everywhere. Oliver's design eliminates grinding worries by keeping the work in full view of the operator at all times. Setups are quick and easy. Results show savings in time plus greater accuracy, less operator fatigue.

The Ace is available in two models: Standard, shown—and Heavy Duty for Tungsten-Carbide and high speed cutters. You will be surprised at the moderate cost.

Send for the Ace Catalog

OLIVER INSTRUMENT CO.
1414 E. Maumee Adrian, Michigan

IMPROVE YOUR TOOLROOM
IT'S THE BACKBONE
OF PRODUCTION

OLIVER OF ADRIAN

AUTOMATIC DRILL GRINDERS
TOOL & CUTTER GRINDERS - DRILL
POINT THINNERS - TEMPLATE
TOOL GRINDERS - FACE MILL
GRINDERS - DIEMAKING MACHINES

R-B INTERCHANGEABLE PUNCHES and DIES

Proved BY YEARS OF USE *in* DIE-BUILDING . . . *in* PRESS OPERATION

Die-makers and press operators everywhere understand the application and use of R-B Interchangeable Punches and Dies—because, for years, these products have been "standard" in the metal-working and plastics industries. As a result, man-hours and money are saved in die-building . . . and press operators have learned how to install and remove them quickly and easily *in the press*, reducing press "down-time" to a minimum. Used exclusively in many plants, they provide a *sure* solution to *simplified* inventories of punches and dies.

R-B punches and dies of standard sizes, shapes and materials are carried in stock for immediate delivery. Special punches and dies are made promptly to your specifications.

Get the WHOLE *Story* IN THIS FREE CATALOG

A 48 page book containing full information on Allied's "one stop service." Write for your copy.

. . . and CHECK THESE R-B ADVANTAGES

- ✓ Simple in design and construction.
- ✓ Unlike most parts used in die construction, R-B products have a salvage value.
- ✓ Securely locked both vertically and radially yet instantly removable.
- ✓ Selected steels with hardness controlled and finished to very close tolerances insure uniformity.
- ✓ Quickly and accurately assembled in die construction.

PRECISION · EXPERIENCE · RESPONSIBILITY
ALLIED CORPORATION PRODUCTS

ALLIED PRODUCTS CORPORATION

Department 24
4612 Lawton Ave. • Detroit 8, Michigan

YES! You can maintain closer broaching tolerances with OILGEAR Pre-Loaded Work Tables

your broached parts are not being finished to consistently close erances and flat surfaces, it is evident that the table operating d holding mechanisms on your broaching machines are yielding tool face angular thrusts. It is equally obvious that *NO* table ich is *NOT* pre-loaded and thus rigidly held in broaching posi- n can withstand these forces without deflection.

This is a broaching problem which Oilgear has solved with its tented and exclusive work table shuttling mechanism which th *locks* and *pre-loads* the tables in broaching position. Under k tonnage tool face thrust there is no measurable table deflec- n. Parts are held firmly in broaching position and do not yield varying broaching tool forces. Consistently close tolerances d true flat surfaces are easily maintained.

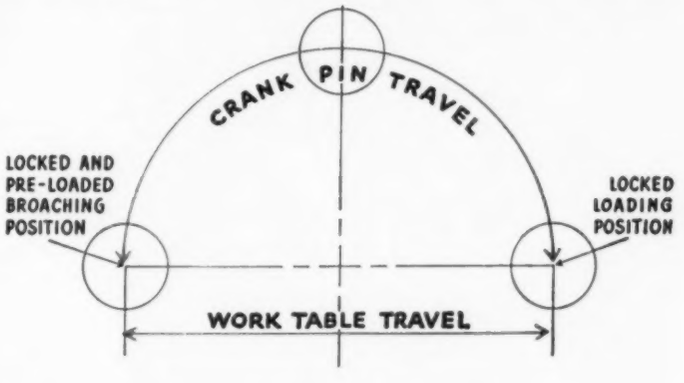
INTERLOCKED TABLE MOVEMENTS

gear work table movements are *interlocked* hydraulically, ctrically and, in the double slide machines, also mechanically, positive sequence operation with tool slide. *No cycle mal- nctioning is possible.* There are no valves to constantly just or maintain. There is no complicated switch arrangement adjust or maintain. For the table interlock, Oilgear uses only e limit switch, only *one* relay.

HARMONIC TABLE MOTION

lgear's fluid power, direct ram-actuated, heavy-duty crank chanism shuttles work table to and from broaching posi- n at controlled high speed. Cushioned, 180° harmonic otion of crank eliminates starting and stopping shocks d positively locks table under pre-load in broaching posi- n. Parts do not have to be clamped before table moves. tomatic clamping and unclamping of work is easily applied.

DIAGRAM ILLUSTRATING
HIGH-SPEED HARMONIC TABLE MOTION



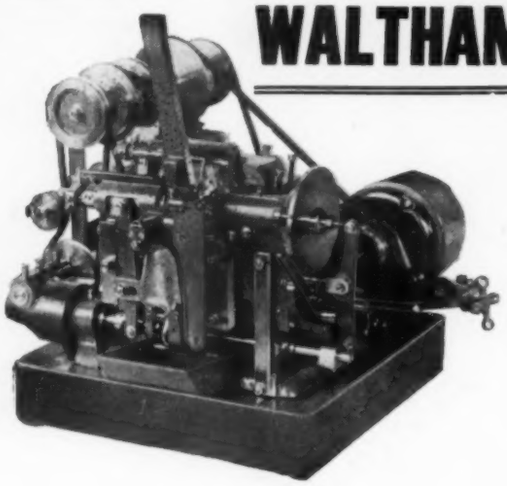
OTHER FEATURES

These and other features such as long table travel for straddle broaching, hardened and ground ways with adjustable gibs which prevent tilting and automatic pressure lubrication to vital points also contribute to the outstanding performance of Oilgear Surface Broaching Machines. Write for descriptive bulletins. THE OILGEAR COMPANY, 1313 W. Bruce Street, Milwaukee 4, Wis.

Oilgear Fluid Power

BROACHING MACHINES AND
BROACHING PRESSES

WALTHAM PINION and GEAR CUTTING MACHINES



Precision and Economy in Mass Production of Small Parts

Specially designed for high speeds and close accuracy, cutting straight teeth in fine pitch pinions, gears and small mechanisms, Waltham Machines are fast, convenient and time-proved on a wide range of work. In all types the same cutting method is employed, by which successive cuts are made by a revolving cutter, blanks being held and indexed by the work spindle. Special cutters furnished to customers' specifications.

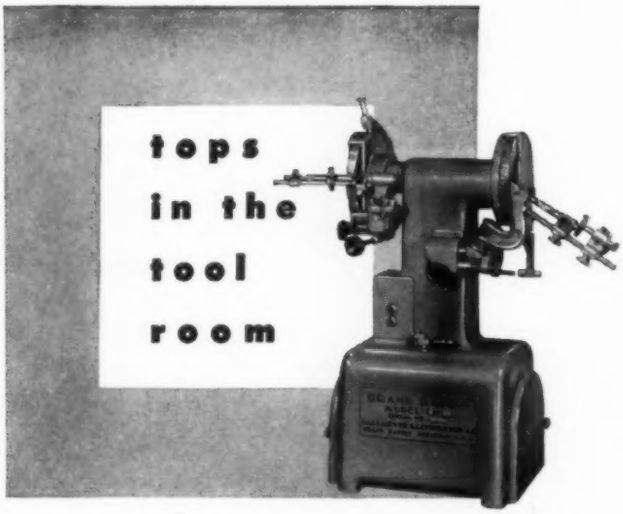
TYPES AVAILABLE

Single Cut Pinion Machines—employing one cutter
Multiple-Cut Pinion Machines—employing 2 or 3 cutters
Magazine-Fed Pinion Machines—fully automatic
Gear Cutting Machines—single and multiple cut types

Write for illustrated literature giving detailed description and specifications.

WALTHAM MACHINE WORKS
WALTHAM, MASS.

WALTHAM
TRADE MARK REGISTERED U.S. PAT. OFF.



Save three ways with Grand Rapids No. BD-1 Combination Tap and Drill Grinder: 1. Lower first cost; 2. Less maintenance expense; 3. Valuable floor space.

Grand Rapids BD-1 combination Tap and Drill Grinder

Write for Bulletin GL-248

GALLMEYER & LIVINGSTON COMPANY
Manufacturers of Grand Rapids Grinders
330 STRAIGHT ST., S. W., GRAND RAPIDS 4, MICH.

A touch is all it takes.

ETNA

Tube Cutoff Machine

THE TUBE REMAINS STATIONARY... IT'S THE CUTTER HEAD THAT ROTATES

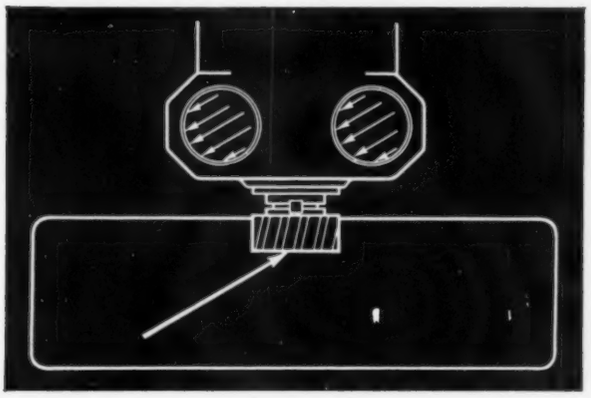
The entire cutoff cycle—clamping of tube, cutting off and unclamping is completely automatic.

SINGLE PUSHBUTTON CONTROLLED

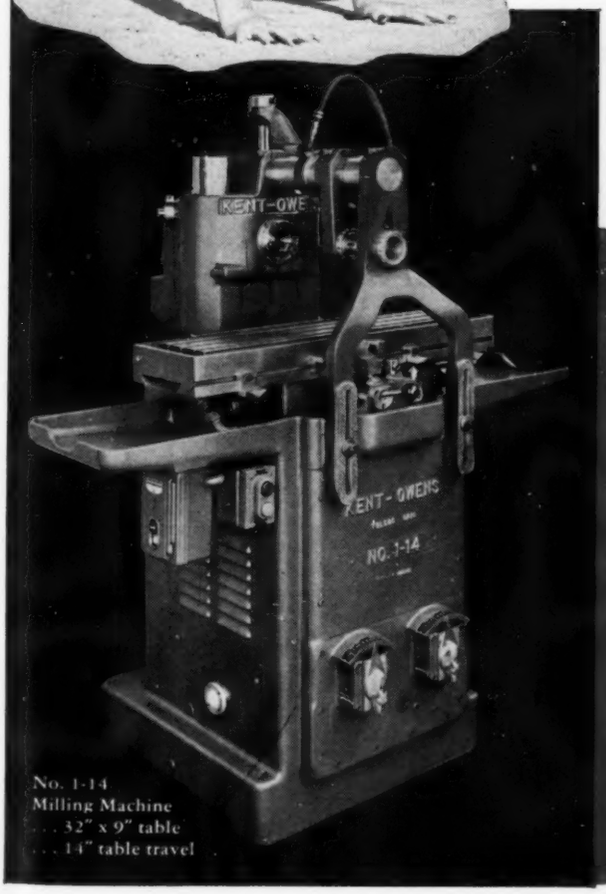
What are you doing about tube cutting?

THE ETNA MACHINE CO.
3409 MAPLEWOOD AVE. • TOLEDO 10, OHIO

Balanced load!



TWIN POST MOUNTING
Means Accuracy
IN TOP-SPEED MILLING



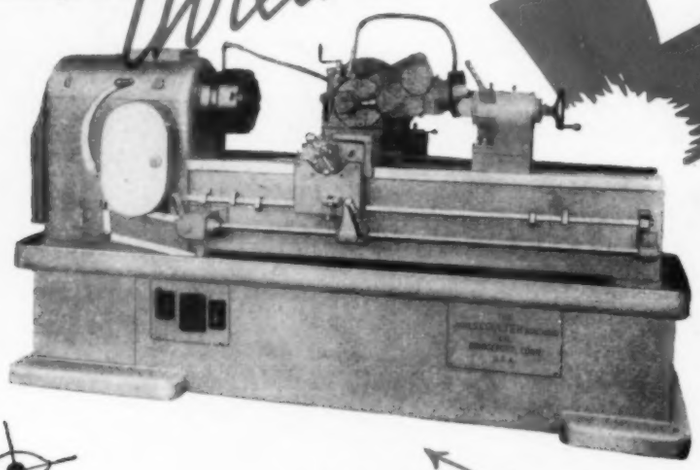
No. 1-14
Milling Machine
. . . 32" x 9" table
. . . 14" table travel

Kent-Owens Machines do your milling *right*—with speed and accuracy that means greater production, fewer rejects, lower costs! The head is mounted on two cylindrical ground steel posts which carry the spindle midway between them—*an exclusive Kent-Owens feature!* No overhang—no cocking action. It's extra rigid . . . practical . . . dependable. Write for bulletins on wide range of hydraulic and hand-operated machines. Kent-Owens Machine Co., Toledo, Ohio.

Call on
KENT-OWENS
for Milling Machines

PRESENTING THE NEW COULTER *Threadmaster*

CHECK and COMPARE



Here at last! The conventional type Thread Milling Machine that produces long and short precision traversing, elevating, cross-feed and lead screws in LESS TIME!

Get the whole story today ••• then CHECK and COMPARE. It's COULTER all the way!

the James COULTER Machine Co.

BRIDGEPORT, CONNECTICUT

MORE DEPENDABILITY
Anti-Friction Bearings and Spiral and Worm Gears in Cutter Spindle Drive.

MORE EFFICIENCY
Full-size spindle and balance wheel on both ends of cutter spindle drive.

MORE CAPACITY
59 speed changes possible with standard equipment. Cut threads from 1/3 to 20 per inch and diametral leads from 7 to 20 in single, double and triple worms, and leads from .050 to 3.000.

MORE ACCESSIBILITY
All speed and feed changes within easy reach of operator for quick change over.

MORE PRODUCTION
Mill hard and soft materials with carbide tools.

These are reasons enough why you need the Coulter THREADMASTER . . . the Thread Milling Machine of tomorrow . . . threading it better and faster, today!

LINLEY

for NOISELESS, HIGH SPEED RIVETING

Rotary spinning principle shapes uniform heads, silently . . . capacities up to 3/8 inch diameters. Adjustable spindle stroke, controlled pressure . . . double row radial thrust bearing supports spindle, assures long life. Table elevating screw prevents slipping. Six floor or space-saving bench models . . . sturdily built for trouble-free operation under severe production schedules.

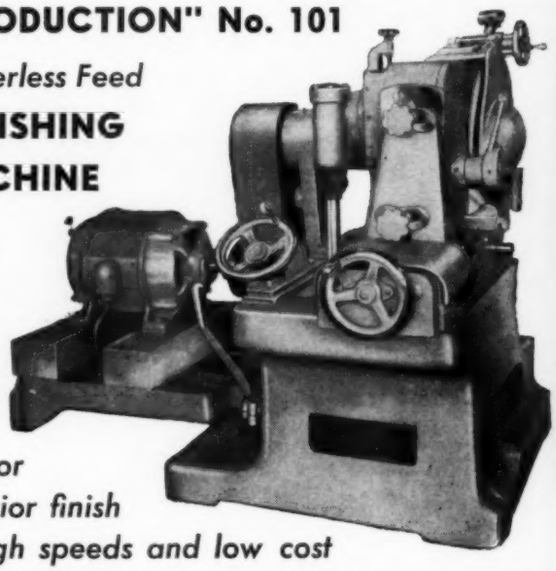
FOR COMPLETE INFORMATION, WRITE FOR BULLETIN.

LINLEY BROTHERS CO., 664 STATE ST. EXTENSION BRIDGEPORT 1, CONNECTICUT

"PRODUCTION" No. 101

Centerless Feed

POLISHING MACHINE



. . . for superior finish at high speeds and low cost

Operation is extremely simple. Work is fed automatically and requires no centering, chucking or holding. An ideal cost-cutting machine for polishing a wide range of cylindrical work.

Regularly furnished with our patent Centerless Feed of the belt type. A Roll Feed for taper cylindrical work is also available. Capacity on cylindrical work: 1/4" to 6" diam.

Write for illustrated literature giving full details.

See our exhibit—Space 1327—National Metal Exposition, Phila., Oct. 25-29

Production MACHINE COMPANY GREENFIELD, MASSACHUSETTS, U.S.A.

Reaming 1¼" holes in a locomotive crossbead guide.

Use Ingersoll-Rand Close-Quarter Air Drills

For those hard-to-get-at jobs that try men's tempers and slow up work, consider these advantages of the Ingersoll-Rand Close-Quarter Air Drills... smoothness, balance and compactness make them easy to operate... extra power produces more work with less effort... durability provides trouble-free service... efficiency and low air consumption reduce operating expense... 13 sizes ranging from light work to over 2" cover a wide range of drilling, reaming, tapping and flue rolling operations.

Call our nearest office for additional information. It's yours for the asking.

AIR TOOLS
COMPRESSORS
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ROCK DRILLS
TURBO BLOWERS
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Vitrified Wheels

VITRIFIED

. . . for

intricate precision grinding or coarse heavy work

Inasmuch as Vitrified manufactures a complete line of Grinding Wheels in numerous grades, grain combinations and bondings, it is merely a matter of selecting the right wheel for the work to be handled.

Because of this wide selection, a Vitrified Wheel can be depended on for economy, speed and long life in the specific service for which it is intended.

Whether your work involves roughing, finishing, surfacing, edging, or cleaning, hand, automatic or swing grinding, there is a Vitrified Wheel which will give you maximum service at minimum cost.

Why not call in a Vitrified representative to show you how you can make worthwhile saving in your grinding operations?

VITRIFIED WHEEL CO., WESTFIELD, MASS.

This Business of Making Holes

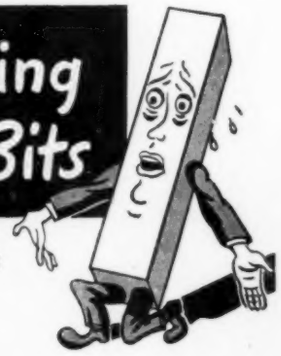
Probably the making of holes in one way or another accounts for more machining operations in the metal-working industries than any other type of stock removal. Mass production cannot be maintained unless fast, accurate equipment for the precision machining of holes is on the job constantly. That is why, since 1901, metal-working shops have been using MOLINE HOLE HOG cost-reducing equipment in production work.

For such operations as Boring, Milling, Straight Line Drilling, Universal Adjustable Spindle Drilling, Honing, Tapping, Reaming and Counterboring, or for ANY special problem, a Moline "Hole Hog" can do it for you faster at less cost.

MOLINE TOOL CO. HOLE-HOG MOLINE, ILLINOIS

MOLINE TOOL COMPANY
100 20th Street Moline, Illinois

Stop Abusing Your Tool Bits



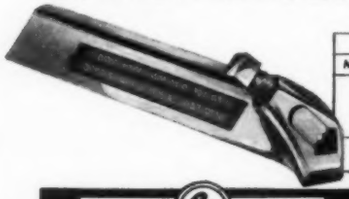
Change Now to Clark Adjustable Tool Holder with Vise-Grip Jaw

Users say: The first real tool holder improvement in 25 years!
Exclusive vise-grip jaw eliminates rocking, because it exerts equalized pressure over *full* length of cutter channel, and not just at one point. Screw-operated jaw runs right to cutting edge and hugs bit so it can't slip, can't sag, can't break!

Holds All Sizes and Shapes
One Clark Adjustable Tool Holder takes 4 or more sizes of square, undersize round or out-of-round, or narrow tool bits for cutting-off or special forming operations. Short bits and stub ends may now be used up.

For Carbide Tools and Boring Bars
In addition to Standard Clark Adjustable Tool Holder with 15° cutter channel, there's the Clark Parallel Tool Holder for better seating and better clamping action on carbide bits, threading tools, and boring bars.

For complete information about Clark Adjustable Tool Holder, call your Clark Cutter Jobber today, or write for catalog E.E.-2.



SPECIFICATIONS		
MODEL	SIZE	TOOL CAPACITY
60	0	1/8 to 5/16
61	1	3/16 to 3/8
62	2	1/4 to 1/2
64	4	5/16 to 3/8

With 15° or parallel cutter channel either left or right hand.

CLARK CC CUTTERS
Robert H. Clark Company
9330 SANTA MONICA BLVD. • BEVERLY HILLS, CALIFORNIA

Turn to INGERSOLL when you need—

Special Steels FOR Special USES

ENGINEERING B-W PRODUCTION

INGERSOLL

Alloy Steels • Armor Plate • Clutch Plate Steels
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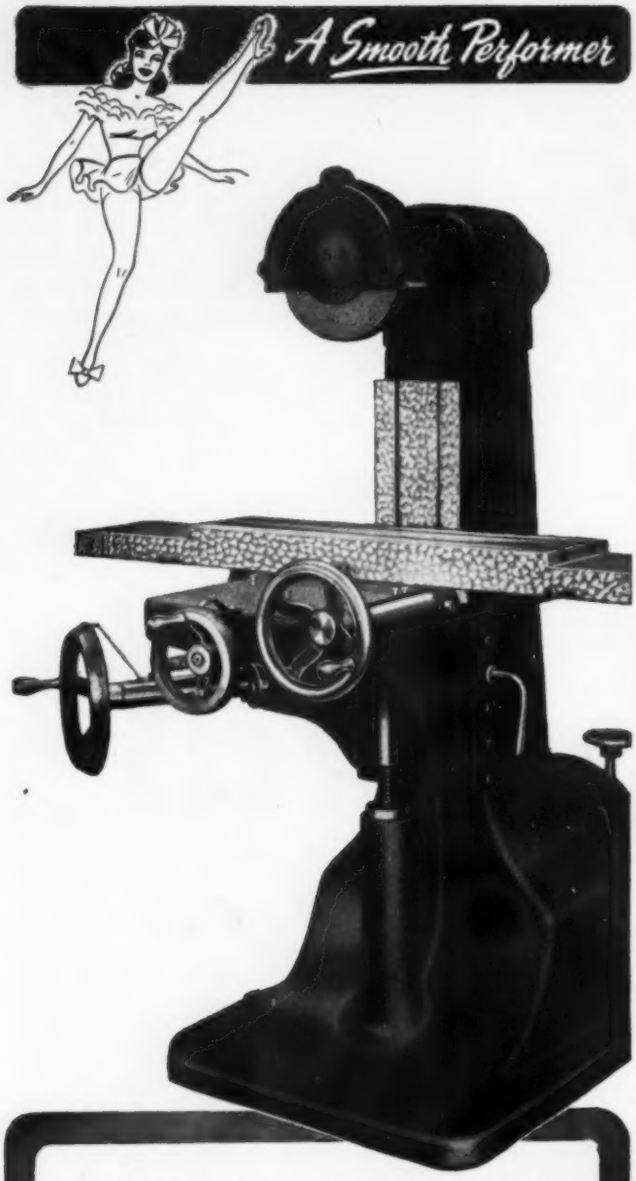
Knife Steels • Saw Steels, including Hack Saw
Blade Steels • TEM-CROSS Steel • Stainless Steels
INGACLAD Stainless-Clad Steel

INGERSOLL STEEL DIVISION

Borg-Warner Corporation, New Castle, Indiana • Plants: New Castle, Indiana; Chicago, Illinois; Kalamazoo, Michigan



NO. 11 LEACH
SURFACE GRINDER

For smooth performance . . . for flexibility . . . for fast, accurate production, the rugged No. 11 Leach Surface Grinder is unequalled — anywhere!

You can depend on Leach engineering!

EXTRA LARGE CAPACITY
6" x 24" x 12"
HEIGHT 52"
WEIGHT 850 lbs.
2 SPINDLE SPEEDS
2600 and 3500 R. P. M.

$750.00

Complete with motor of standard current characteristics F.O.B. Factory

For further information write Dept. A

WORLD DISTRIBUTORS
H. LEACH MACHINERY CO.
387 CHARLES ST., PROVIDENCE 4, RHODE ISLAND
AGENTS IN ALL PRINCIPAL CITIES

L-W
SWIVEL BASE MILLING MACHINE VISES

MASTER $42.25
Jaws: 6½" wide, 2" deep. Opens 4" with jaws, 5¼" without. Wt. complete with crank, boxed, 85 lb.

JUNIOR $31.45
Jaws: 4½" wide, 1¾" deep. Opens 3" with jaws, 3½" without. Wt. complete with crank, boxed, 35 lb.

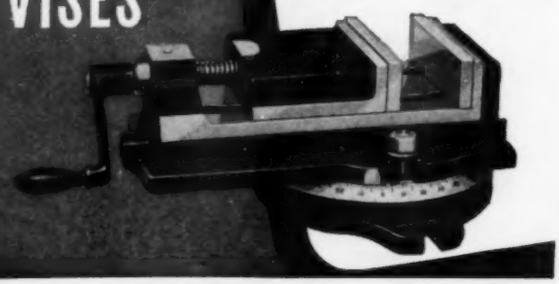
HUSKY 3" $18.80
Jaws: 3" wide, 1" deep. Opens 2" with jaws. Wt. with crank, 16 lb.

STEEL JAWS
Suited to drill press and shaper work.

GRADUATED BASE
Can be used plain or swivel.

LARGE ACME STEEL SCREW
Contributes sturdy durability.

FOUR BOLT AND KEY SLOTS
are provided for rigidly attaching to machine table so that work holding surfaces are at true right angles or parallel to table.

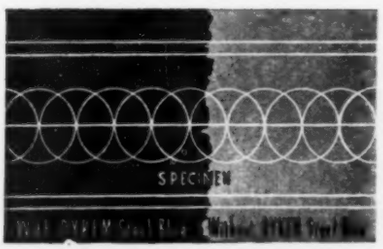


Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products

L-W CHUCK COMPANY 2550 ST CLAIR ST TOLEDO 4 OHIO

DYKEM STEEL BLUE

STOPS LOSSES
making dies & templates



Simply brush on right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY, 2301 B North 11 St., St. Louis, Mo.
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HARDNESS TESTER

The *Scleroscope* is the only hardness tester that takes in the entire range from the softest to the hardest metals without any adjustments.

MODEL D-1 DIAL TYPE
Write for Circular!

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JAMAICA, NEW YORK
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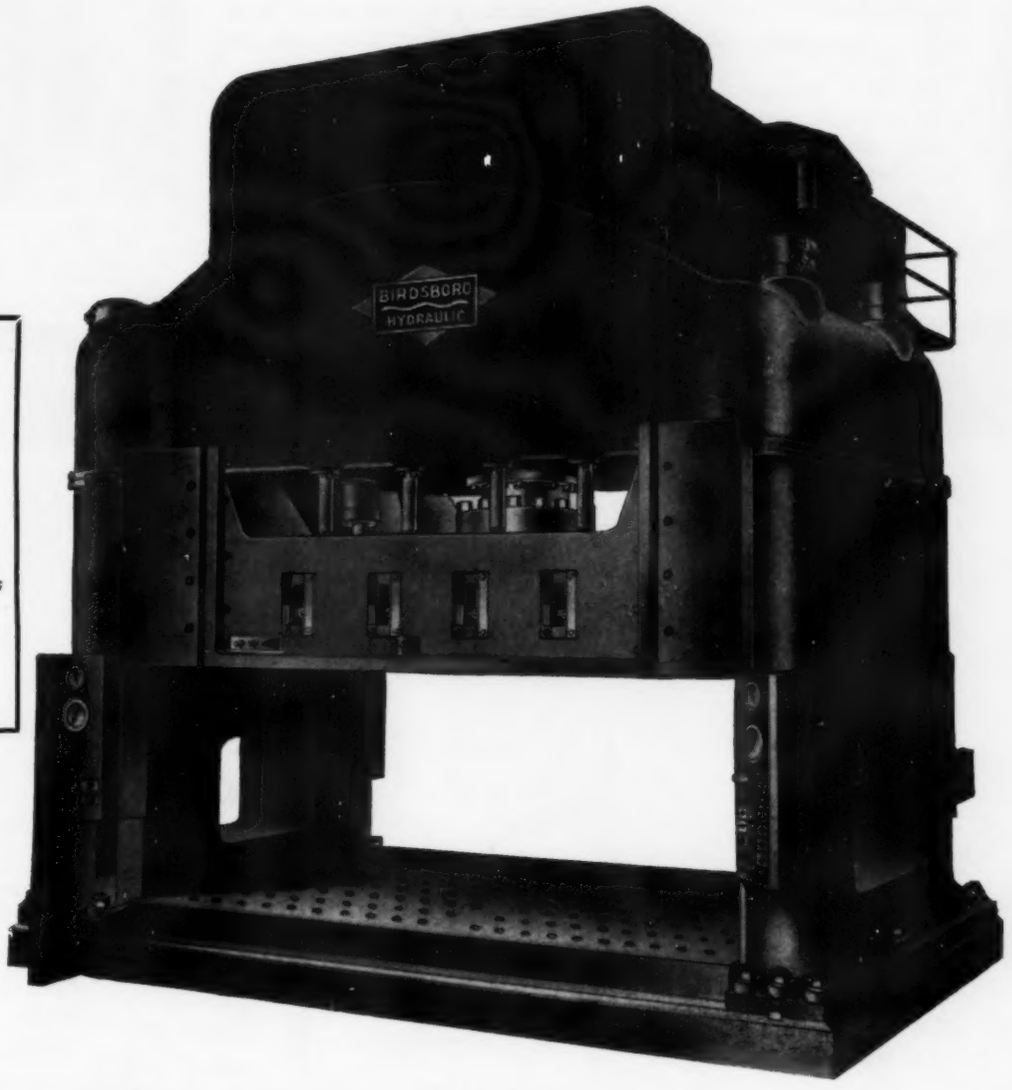
BIRDSBORO HYDRAULIC

Behind This TRADE MARK Stands Faster, More Economical Press Production

Wherever you find this trade mark, you'll find Birdsboro Hydraulic Presses turning out precision parts of highest quality . . . and producing more of those parts per hour.

To get the most per dollar invested when purchasing your next hydraulic press, be sure it carries this trade mark. Skilled Birdsboro engineers are ready to consult with you on your specific press problems.



HYDRAULIC SINGLE ACTION DEEP DRAW SHEET METAL PRESS — HOUSING AND SHRUNK TIE ROD TYPE WITH HYDRO-PNEUMATIC CUSHION IN BED

- 500 ton main ram capacity
- 180 ton cushion capacity
- Working area: 144" right to left; 60" front to back
- Daylight opening—60"
- 125 H. P. motor
- 20' overall height above floor

Agents in: Chicago, Illinois—Cincinnati, Ohio—Detroit, Michigan—St. Louis, Missouri—Tulsa, Oklahoma.

Birdsboro Steel Foundry & Machine Co. • Birdsboro, Pa.

BIRDSBORO HYDRAULIC PRESSES

Designers and Builders of:

- Steel Mill Equipment
- Rolls
- Special Machinery
- Crushing Machinery
- Steel Castings
- Hydraulic Presses

Positive action of BARRETT TYPHOON CENTRIFUGAL WASHERS provides for quick, thorough parts cleansing

In these efficient centrifugal machines the washing solution enters the top of the whirling load under valve control. The operating principle—being that of a typhoon—gives the washing solution a spraying, swirling, and surging action which thoroughly permeates the contents. During this action, centrifugal force creates hydrostatic pressure within the basket. That proportion of the deluge going to the bottom is forced up the side and out carrying off the contaminated fluid.

A thorough, quick cleaning is definitely assured by flowing sequence. Two or more liquids may follow, making it possible to wash, rinse or provide any further treatment as required.

Several Barrett installations involve the use of four machines operated by one man who loads and unloads in three minute cycles. Washing time is only one minute. Another type of set-up provides for recovering oil, washing, drying, and coating with rust-proofing material.

As in all Barrett Centrifugal machines, provision is made for convenience and safety of operation.

Send at once for details of Barrett Typhoon Washer

Barrett Centrifugal Washer—made in capacities from 13 to 36 cu. ft. per hour. Each size, depending on condition, will perform at the rate of 20 duty cycles per hour.

THE LEON J. BARRETT COMPANY, 1800 Grafton Road, **WORCESTER, MASS.**

Designers and Builders of Centrifugal Machinery

DON'T LET ITS SMALL SIZE FOOL YOU

Tuthill Model L pumps may be small in size, but they are outstanding in performance for pressure lubrication and hydraulic service. These internal-gear rotary pumps feature the Tuthill mechanical seal for leak-free performance and low power consumption. Capacities up to 3 g.p.m. and pressures to 400 p.s.i. Ring or foot mounting. Many porting arrangements. Write for bulletin on Tuthill Small Industrial Pumps.

TUTHILL PUMP COMPANY
939 East 95th Street, Chicago 19, Illinois

WILSON M.I. STANDARDIZING LABORATORY

...where hardness testing ACCURACY begins

● Only WILSON makes the "ROCKWELL" Hardness Tester, the "TUKON" Hardness Tester and the "ROCKWELL" Superficial Hardness Tester. Universal acceptance of and confidence in these instruments — as well as Wilson-made "BRALE" diamond penetrators, KNOOP and 136° square base pyramid diamond indenters and test blocks — are founded on the dependable accuracy of all Wilson products. This accuracy is rigidly maintained by the WILSON STANDARDIZING LABORATORY.

See these machines and accessories at our Booth #116 at the Metal Show.

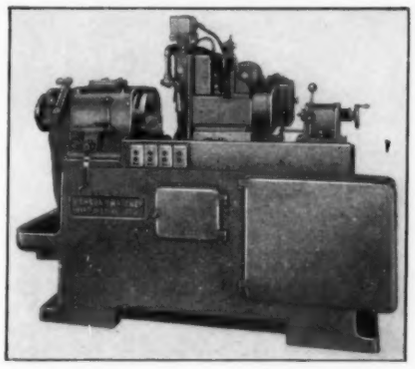
WILSON
MECHANICAL INSTRUMENT CO., INC.
AN ASSOCIATE COMPANY OF AMERICAN CHAIN & CABLE COMPANY, INC.
230-B PARK AVENUE, NEW YORK 17, N. Y.

ACCO

New Hanson-Whitney Semi-Automatic Thread Grinder

For uninterrupted high speed, lower cost grinding of external threads, Hanson-Whitney introduces this important new machine.

Features include a Master roll to maintain the life of a Crusher



roll, which in turn crush-forms the grinding wheel with a wide variety of multi-thread patterns which are then transferred to the work. All operations except work loading are automatic.

The multi-rib principle of crushing the thread pattern onto the grinding wheel . . . threading maximum 2″ in length in one and one sixth revolution of the work . . . produces accurate, properly mated threads, closer limits, and size duplication . . . at the highest speeds.

When the Crusher roll pattern has become worn by repeated crushing of the wheel, the Master roll re-crushes the wheel so that the pattern may again be ground onto the Crusher roll . . . easily and fast. Production is maintained . . . no need to send Crusher roll away for regrinding.

A crush-dressed multi-ribbed grinding wheel produces the complete length of thread within the capacity of the machine in the time required to produce *one* thread with a single point grinding wheel. The multi-ribbed wheel also produces many more pieces per dressing and results in uniform threads, correct in lead, angle and diameter.

One great advantage of this machine is that it permits the threading and forming of heat-treated material that is too hard to be thread-milled.

New Bulletin on request. Use address at right.

6HW48

Who says:

"A TAP IS A TAP?"

We can't go along with that statement. It's like saying, "A book is a book" . . . (or, closer to home) "A machinist is a machinist."

If you believe that all engineers, machinists, machines, steels, coolants, inspectors, etc. are alike . . . then you might say, "A tap is a tap." But at Hanson-Whitney we know better. So do the thousands of buyers of H-W Taps . . . many of whom have been repeating customers since we pioneered the "finished" tap . . . threads ground after hardening.

H-W Taps are the result of the closest control over materials, men, and machines . . . control that has been evolved through many years of leadership in supplying the right tap for the specific job.

So . . . let's not say, "A tap is a tap" . . . let's say an H-W Tap is a tap of the highest quality, measured, of course, by the number of holes tapped per grind.

HANSON-WHITNEY MACHINE CO. HARTFORD 2, CONN.
Division of Whitney-Hanson Industries, Inc.

For practical recommendations submit your problems to Hanson-Whitney engineers.

Hanson Whitney

PIONEERS OF FINISHED TAPS

MAIL THE COUPON for YOUR COPY!

IF YOU DO THREADING

whether external, internal, right or left hand, tapered, round, square, trapezoidal, buttress, multi-start or special threads.

SEND FOR THIS IMPORTANT BOOKLET

it tells you how you can reduce threading time from minutes to seconds!

The LEES-BRADNER Company
CLEVELAND 11, OHIO, U.S.A.

Please send me your Bulletin 75-A on the Cri-dan Threading Machine.

Company_____
Address_____

LAYOUT FLUID

Send for Your FREE Sample

For Machinists, Toolmakers, Diemakers, Model Makers, Template Makers and Layout Men—also for general machine shop and toolroom use on tools, dies, jigs and fixtures and machine surfaces, this Layout Fluid has a considerable advantage over the old copper sulphate method.

With the use of this Layout Fluid, you simply wipe the surface clean and brush it on. It dries instantly.

SEND FOR YOUR FREE SAMPLE of this Combination Brush-in-can. Please use your letterhead.

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

BUY U.S. SECURITY BONDS NOW!

"With

GULF Electro Cutting Oil

we increased chaser life 48%–

and get better finishes"

says this Foreman

The machine shop Foreman of Victor-Ray Corporation, New Britain, Conn., consults with a Gulf Lubrication Engineer (right) on results with Gulf Electro Cutting Oil in threading bolts.

"Not satisfied with our chaser life in threading studs from ¾" bar stock, we tried several different cutting oils in an effort to improve it," says this machine shop Foreman. "On every count, Gulf Electro Cutting Oil has delivered the best performance. Since we have adopted this fine cutting oil, our chaser life has increased 48 per cent, and we get better finishes."

Every Gulf Cutting Oil has specific properties which insure better performance on certain types of jobs! Call in a Gulf Lubrication Engineer today and let him show you how they can help you improve your machining practice. Write, wire, or phone your nearest Gulf office.

Gulf Quality Cutting Oils

Gulf Lasupar Cutting Oils A, B, and C
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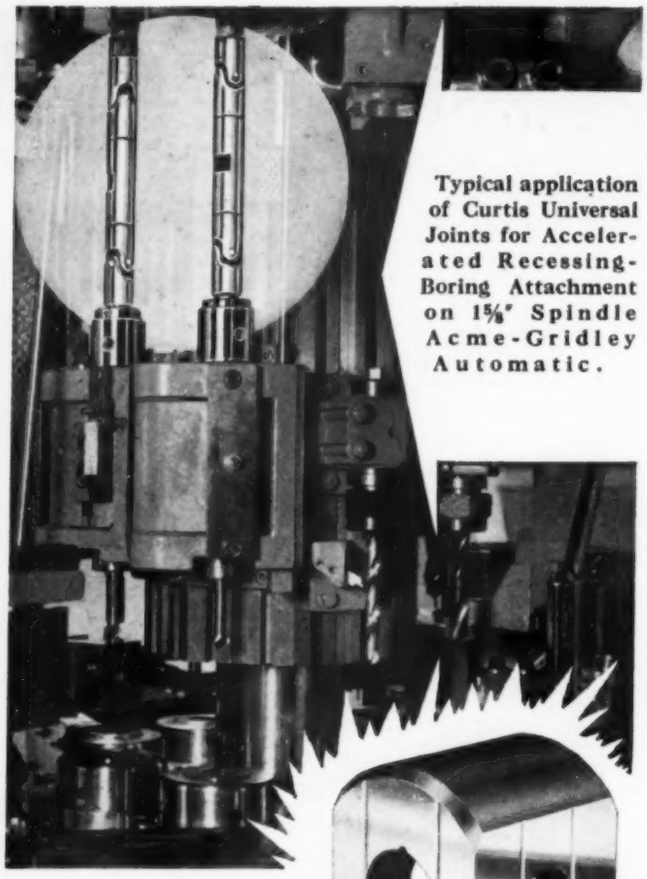
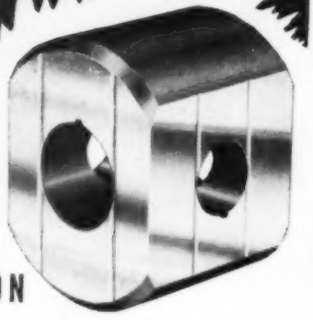
GULF INDUSTRIAL LUBRICATION



Typical application of Curtis Universal Joints for Accelerated Recessing-Boring Attachment on 1⅝" Spindle Acme-Gridley Automatic.



"LO-FRICTION" CENTER BLOCK
+
PROPER-LUBRICATION
=
LONG-LIVED EFFICIENCY . . . . . .

Two features offered in Curtis Universal Joints in 1¼" or larger sizes, tend greatly to increase their efficiency and life as well as to eliminate costly shutdowns for replacements.

1 — The New Curtis "Lo-Friction Center Block" — with two grooves on each bearing surface — reduces the size of frictional areas — distributes wear more evenly and permits more efficient lubrication.

2 — Curtis pioneered proper joint lubrication many years ago with a patented oiler. This oiler directs oil through large pin into center of joint, where centrifugal force distributes it through scientifically designed passages, in and on the center block, to all essential points of wear.

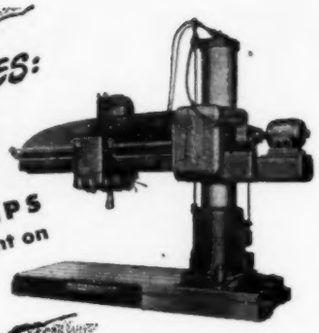
Curtis does not use covers or boots packed with grease as a means of lubrication. Tests show grease or oil is thrown outward away from bearings by centrifugal force and onto the inner surface of such coverings.

When in need of industrial universal joints be sure of the best — Specify Curtis Universal Joints. Send for Engineering Data and useful drafting templates.

Write Dept. B-3

CURTIS UNIVERSAL JOINT CO. INC. SPRINGFIELD MASS.

CARLTON SUPPLIES:
RUTHMAN GUSHER
COOLANT PUMPS
as standard equipment on their radial drills.



Yes, more and more of the leading machine tool manufacturers all over the country supply Ruthman Gusher Coolant Pumps as standard equipment on their machines. They have learned from experience that Ruthman Pumps give their customers long service, low maintenance costs and efficient operation at all times.

Illustrated above is a Carlton Radial Drill equipped with a Model UL Immersed type Gusher Coolant Pump.

Photo Courtesy The Carlton Machine Tool Company Cincinnati, Ohio

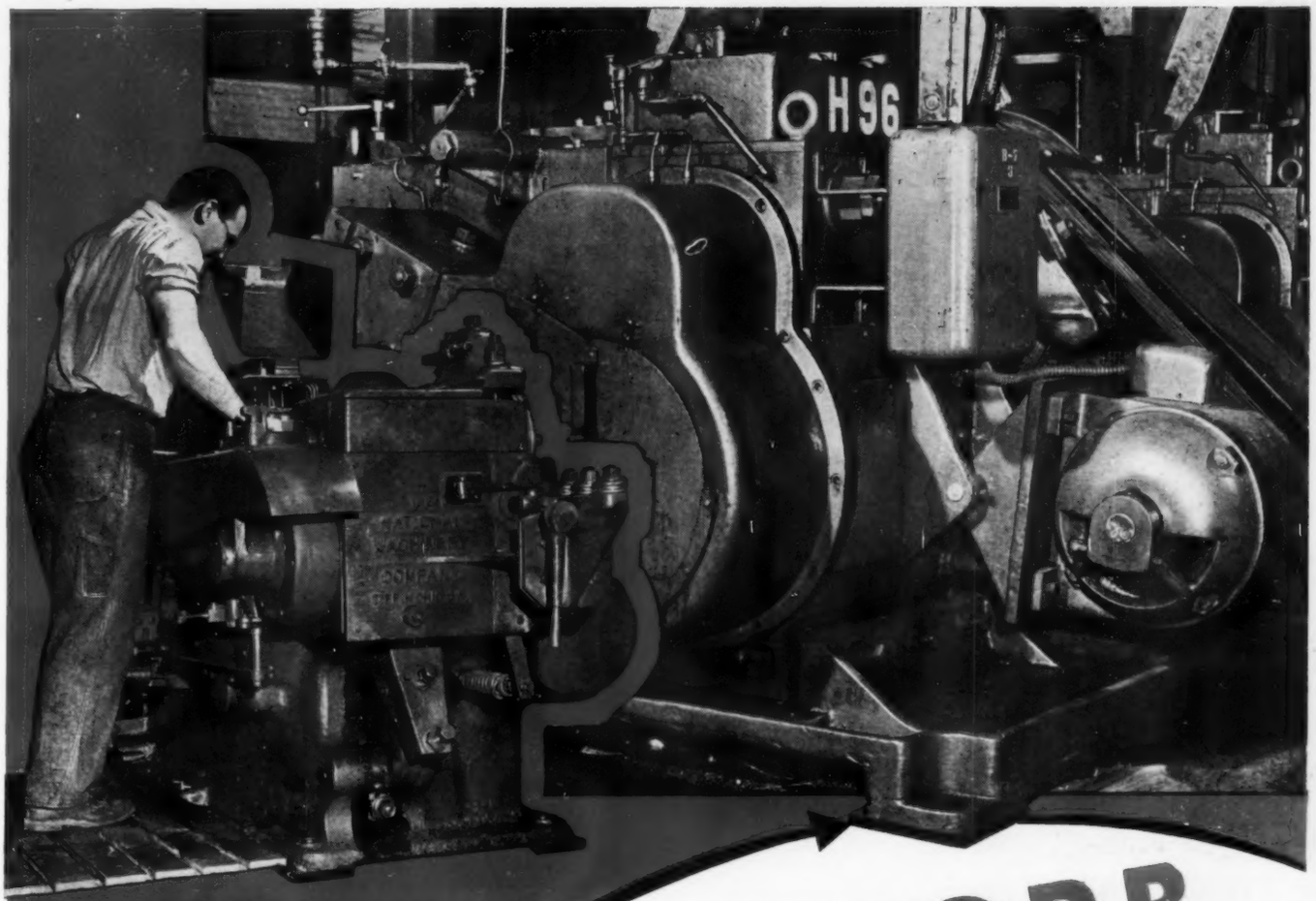
THE RUTHMAN MACHINERY CO
1818 READING ROAD CINCINNATI 2, OHIO

ECONOMY
THE W&B CO

ECONOMY Lubricant 1888
fluid type - water soluble
For Grinding and Cutting

More pieces per wheel dressing, keener grinding, closer tolerances.

THE WHITE & BAGLEY COMPANY
WORCESTER, MASS. • DETROIT, MICH.
Originators of Grinding Lubricants



American Screw Company Mounts Big Heading Machines On UNISORB without BOLTS OR LAG SCREWS

These big Waterbury Headers pack such a mighty punch that, when they were conventionally anchored, it was frequently necessary to tighten up on floor bolts or replace broken ones. Now that they are mounted on Unisorb, vibration is almost negligible.

The Company further reports that fewer man hours are required for machine installations on cement floors.

By controlling vibration, Unisorb reduces shut-down hours—saves on machine repairs and building maintenance. By providing quieter surroundings, it increases efficiency—helps toward greater production.

Send for sample and complete specifications.

LOOK FOR THE RED CENTER AND UNISORB BRAND MARK

THE FELTERS COMPANY

210-A SOUTH STREET, BOSTON, MASSACHUSETTS

Offices: New York, Philadelphia, Chicago, Detroit
Sales Representatives: San Francisco, St. Louis.
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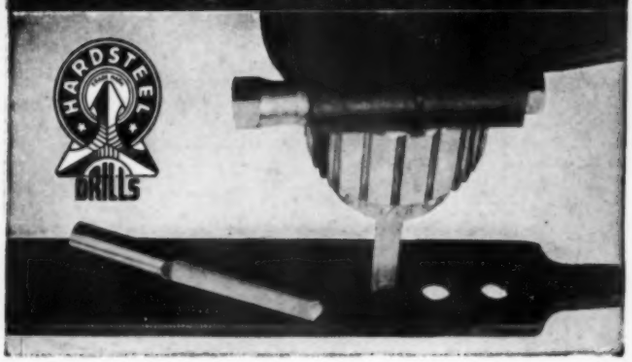
Drill Hardened Steels *without Annealing* with "HARDSTEEL"



Don't let anyone tell you that hardened steels must be annealed before drilling, countersinking, counterboring or reaming.

With "HARDSTEEL" drills you can produce accurate, smooth holes in steels hardened by any process — oil-hardened, water hardened, cyanided, nitrided, and they work equally well on work-hardening steels, and high carbon-high chrome steels of any degree of hardness.

"HARDSTEEL" drills used with standard drill presses cut costs in production shops because parts drilled after hardening always match at assembly. In service shops they save time and material and permit engineering changes calling for additional drilling to be made after parts are full hardened.

Write for a copy of the "HARDSTEEL" Operators Manual showing how "HARDSTEEL" drills are now functioning in thousands of plants in parts recovery operations.

You Harden It — We'll Drill It — with "HARDSTEEL"

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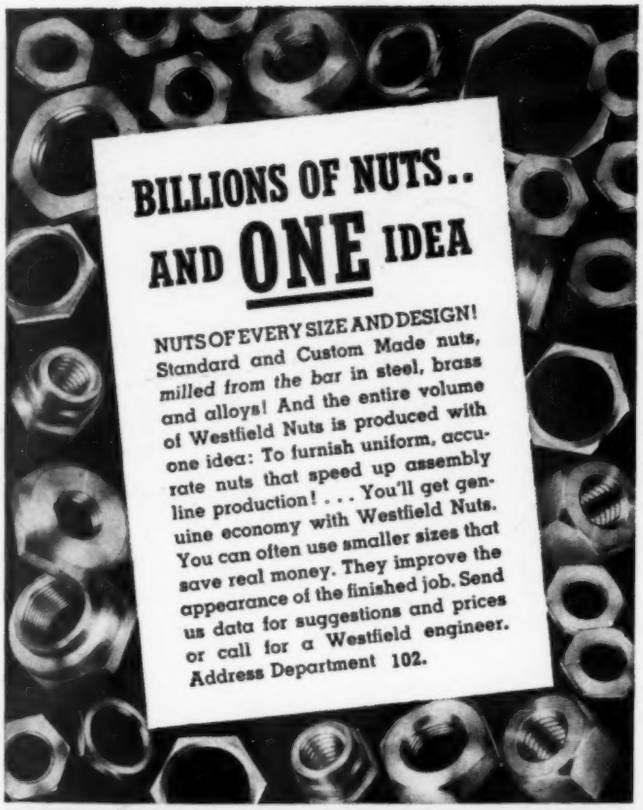
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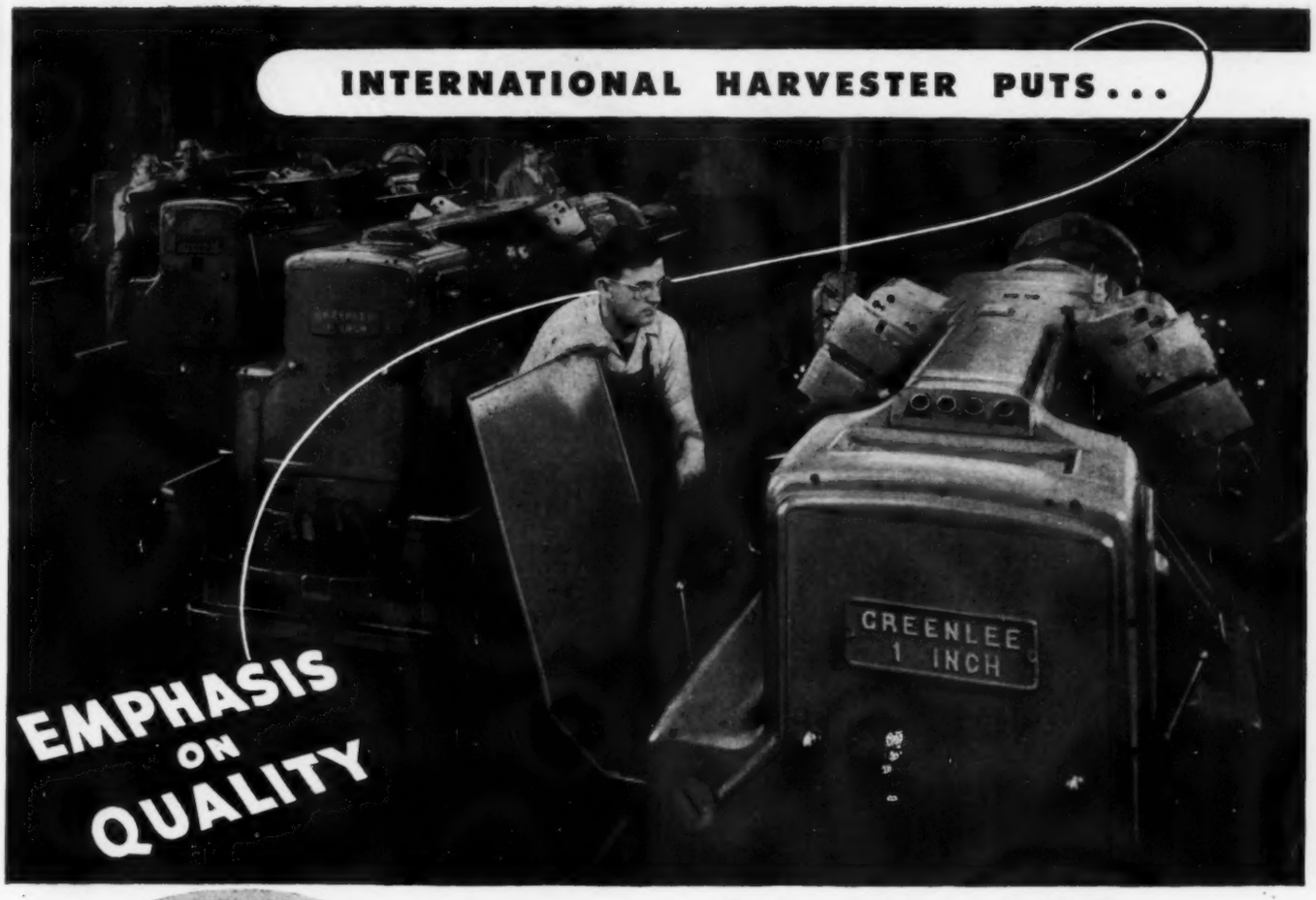
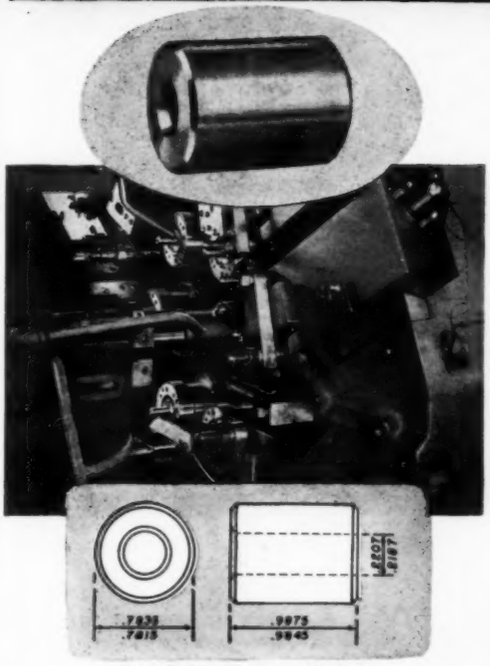


EMPHASIS ON QUALITY

WITH GREENLEE SIX-SPINDLE AUTOMATICS



TYPICAL JOB:

The above part for an International Diesel Engine Injection Pump is produced on a 1" Greenlee "6". The part, a nozzle valve guide, is completed as shown with a tolerance of .002" on the hole diameter. A later operation grinds the hole to .0005" tolerance. An accelerated reaming attachment is used as shown in the 6th or cutting position for the finishing operation of the center hole. The accelerated action of the attachment permits its use on the Greenlee in four positions, including cut-off.

CONTROL SYSTEM SAVES TIME FOR FOREMAN

A system of quality control and a little teamwork between the inspection and screw machine departments of International Harvester Co., Milwaukee, has elevated production standards and lowered scrap losses in the manufacture of parts for Diesel Engine Injection Pumps.

In the screw machine department pictured above, where four Greenlee 6-Spindle Automatics are at work, the inspector makes an hourly spot-check of parts produced by each machine. It is an important part of a quality control system which aids operators, helps maintain standards, and at the same time allows the foreman more time to handle set-up, tooling, and scheduling problems.

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WRITE TODAY FOR NEW LITERATURE describing quick-change features and the new interchangeable lead-screw threading feed for the Greenlee Automatic. Ask also for details on the 16 mm. sound movie describing the building of a Greenlee "6".

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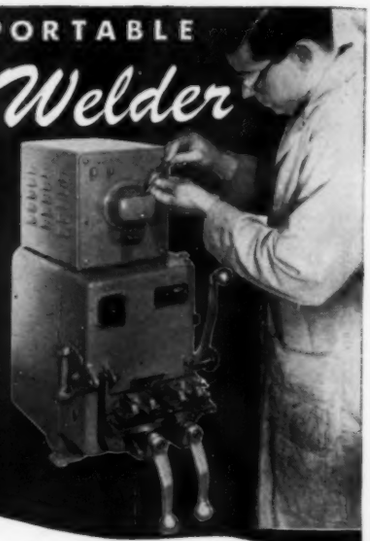
(DBW-5)



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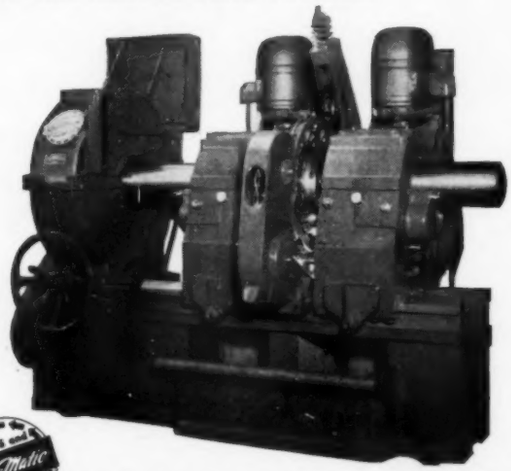

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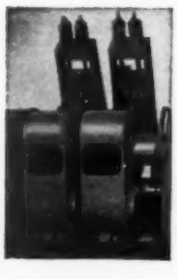

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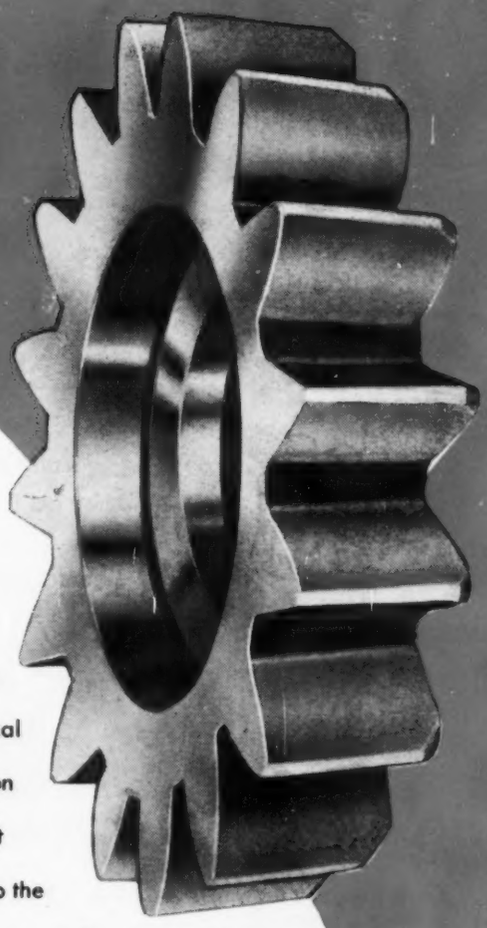

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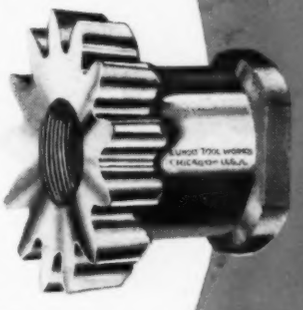

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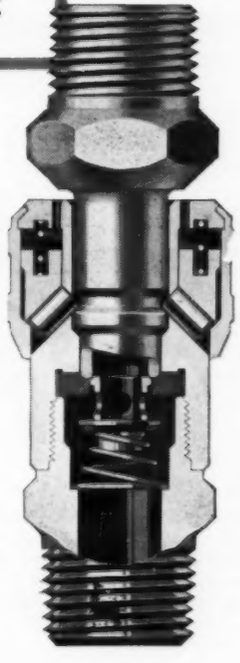

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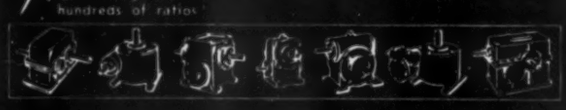

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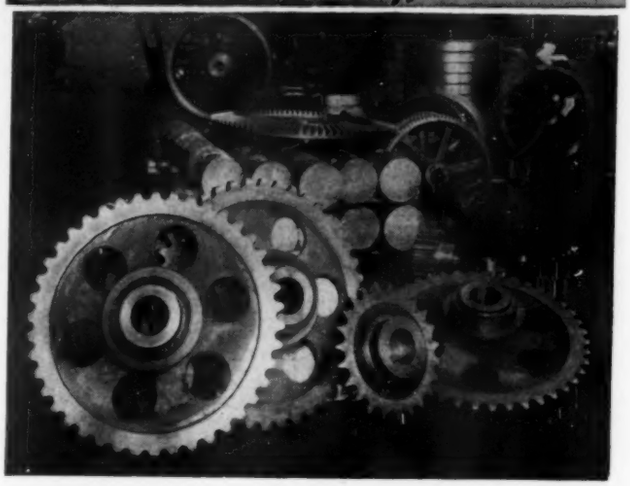

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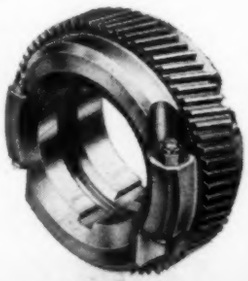

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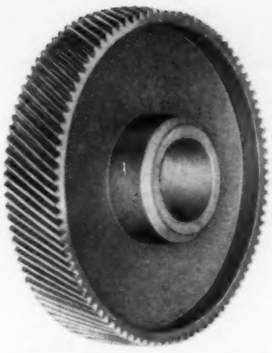

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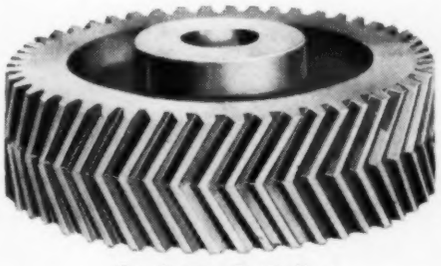
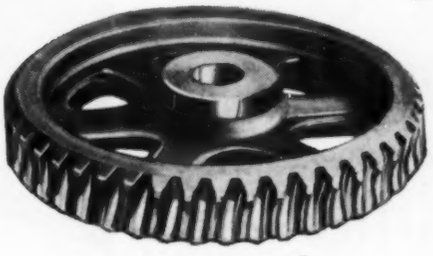


Continuous Tooth Herringbone Gears up to 60" diameter; Separated Tooth Gears up to 150" diameter.



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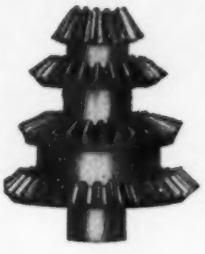

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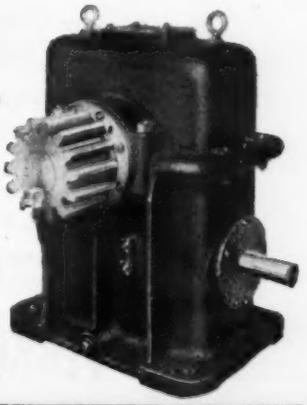

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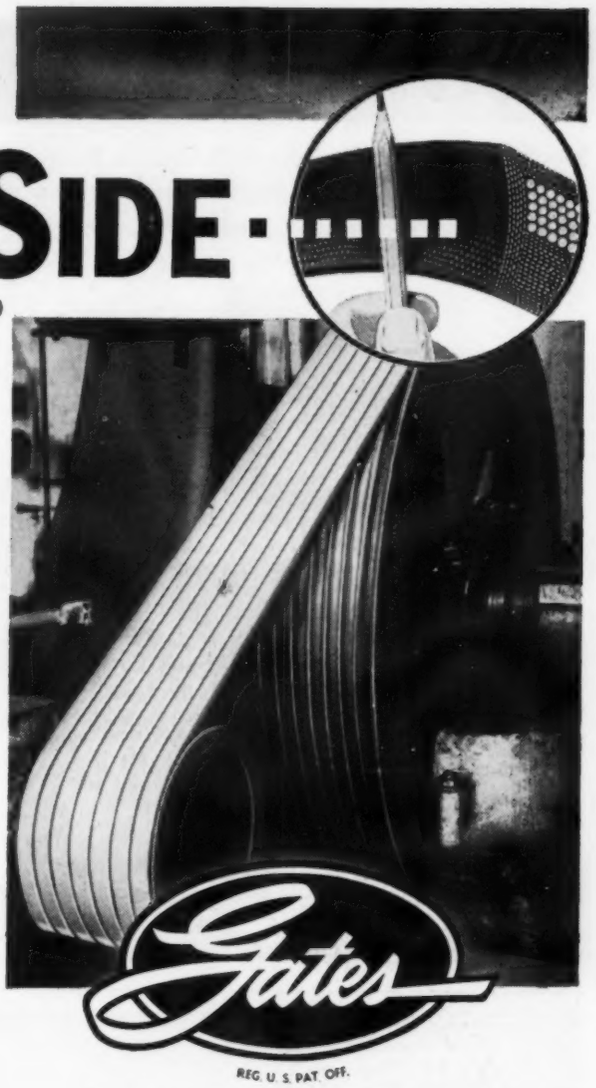
(U.S. PATENT NO. 1813698)



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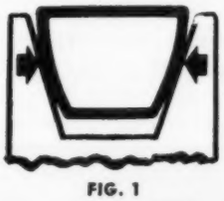

FIG. 1

Because of these stresses, any V-Belt built with straight sides is forced to assume, in the sheave groove, the shape shown in figure 1, on the left.

This forced bulging of a *straight-sided* V-Belt against the sheave groove walls naturally produces excessive wear along the *middle* of the belt's sides—as indicated by the arrows. Also, because the full side of the belt does not *uniformly* grip the pulley, there is a definite loss in drive efficiency.

Now see the difference when you bend the V-Belt that is built with the precisely engineered Concave Side (U. S. Patent No. 1813698)—the Gates Vulco Rope.

FIG. 2

As the Gates Vulco Rope bends, its Concave Side becomes straight (Figure 2). It exactly fits the sheave groove—and this gives you two very definite savings:—

(1) No out-bulge of the sides means uniform side-wall wear—*longer life!*

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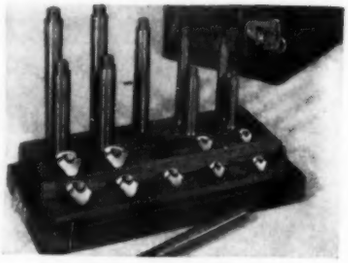
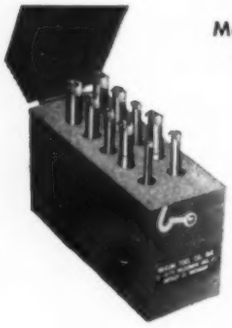
Hole diameter range: 1 1/16" to 3⅜"

Maximum depth range: 6¾"





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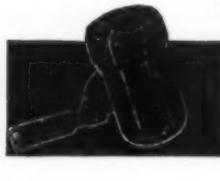

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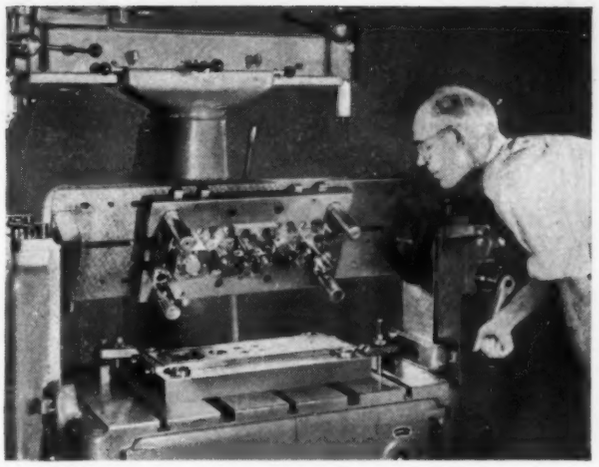

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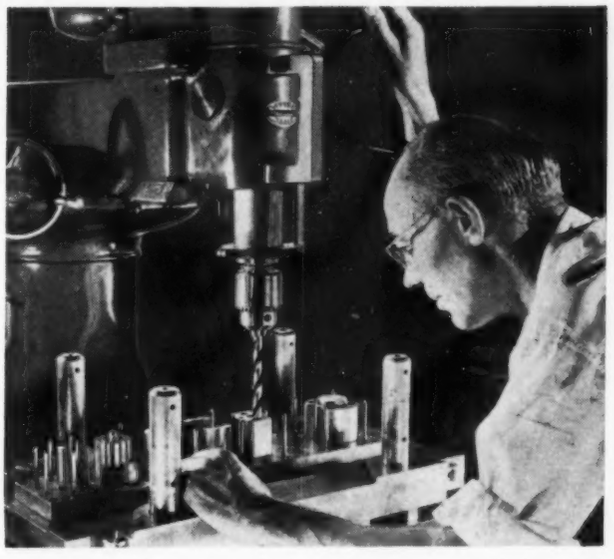
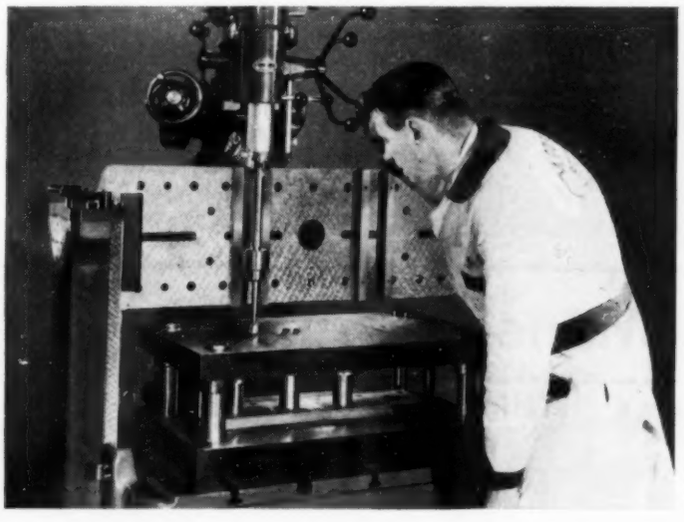


Drilling punch in place. Spring holes are also drilled. Radial drill has 1½" capacity. Tapping is done in same set-up with Lassy Tap Set.



← Counterboring for heads of screws tapped into punch flange, showing the use of ¾" chuck with long shank.

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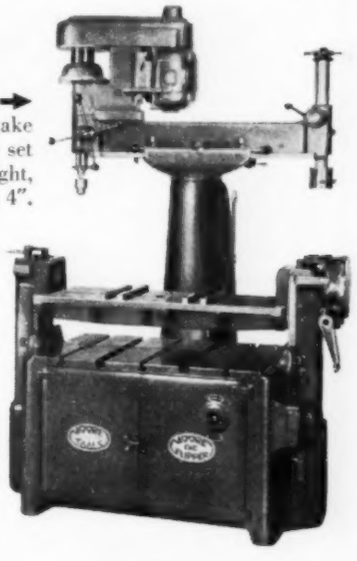

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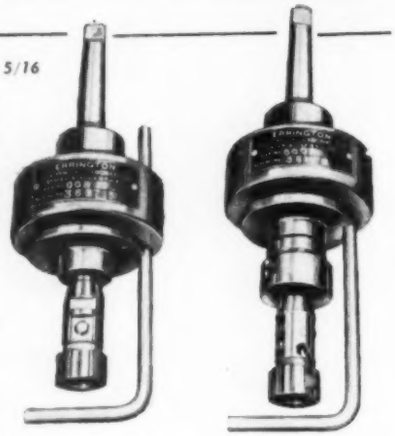

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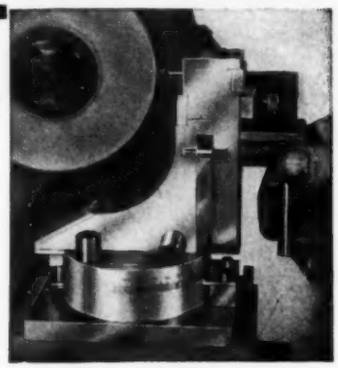

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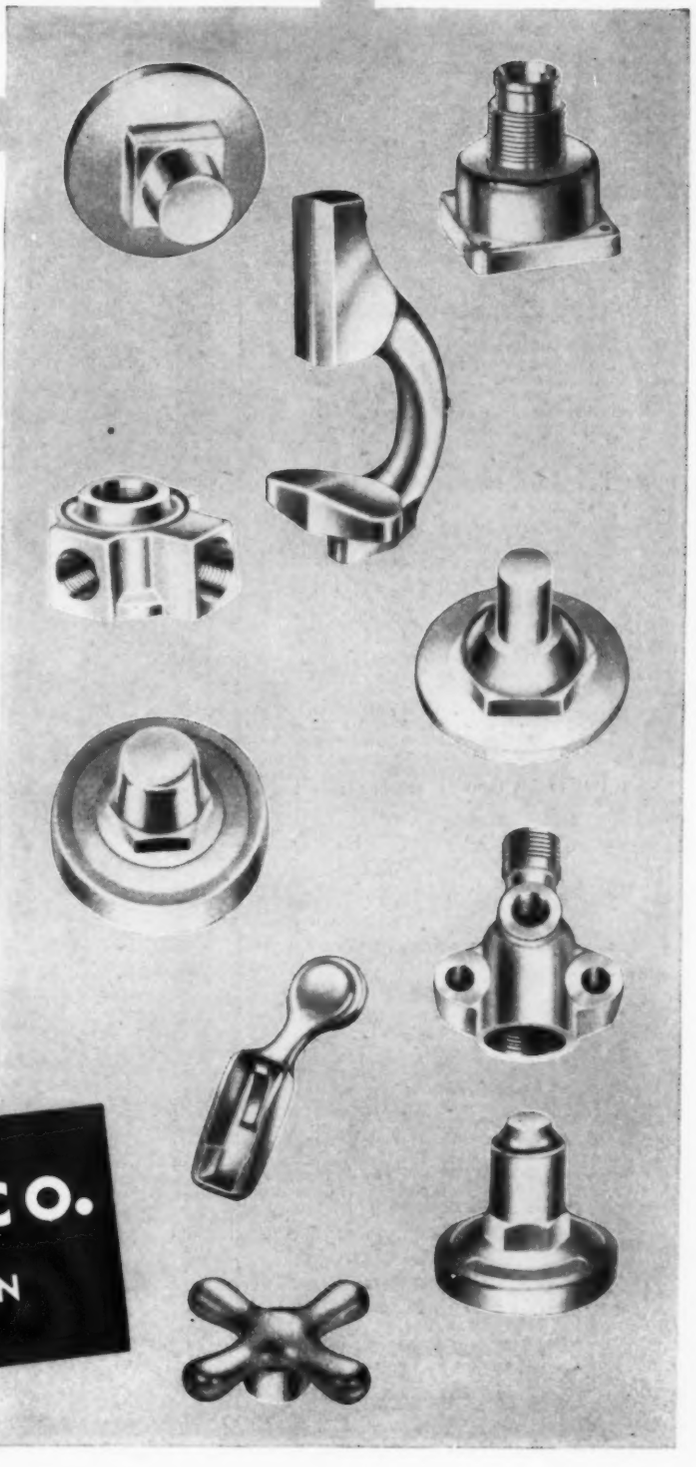

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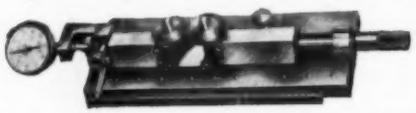

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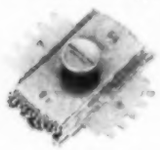

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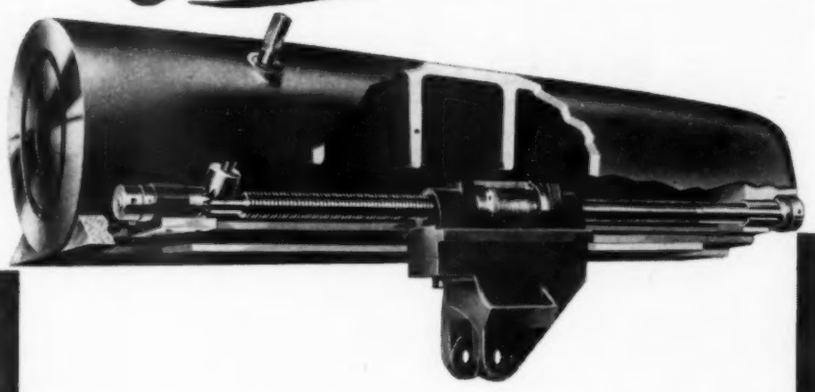

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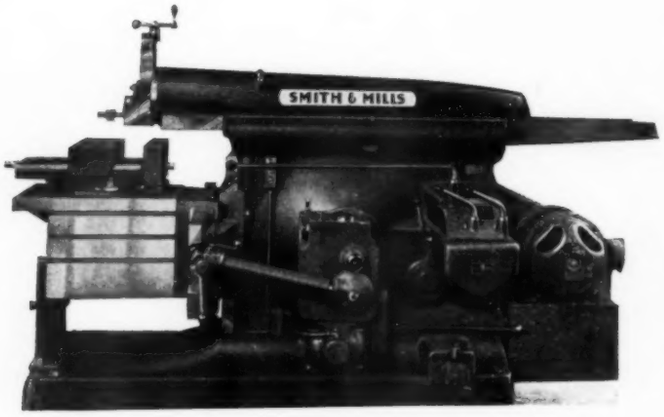

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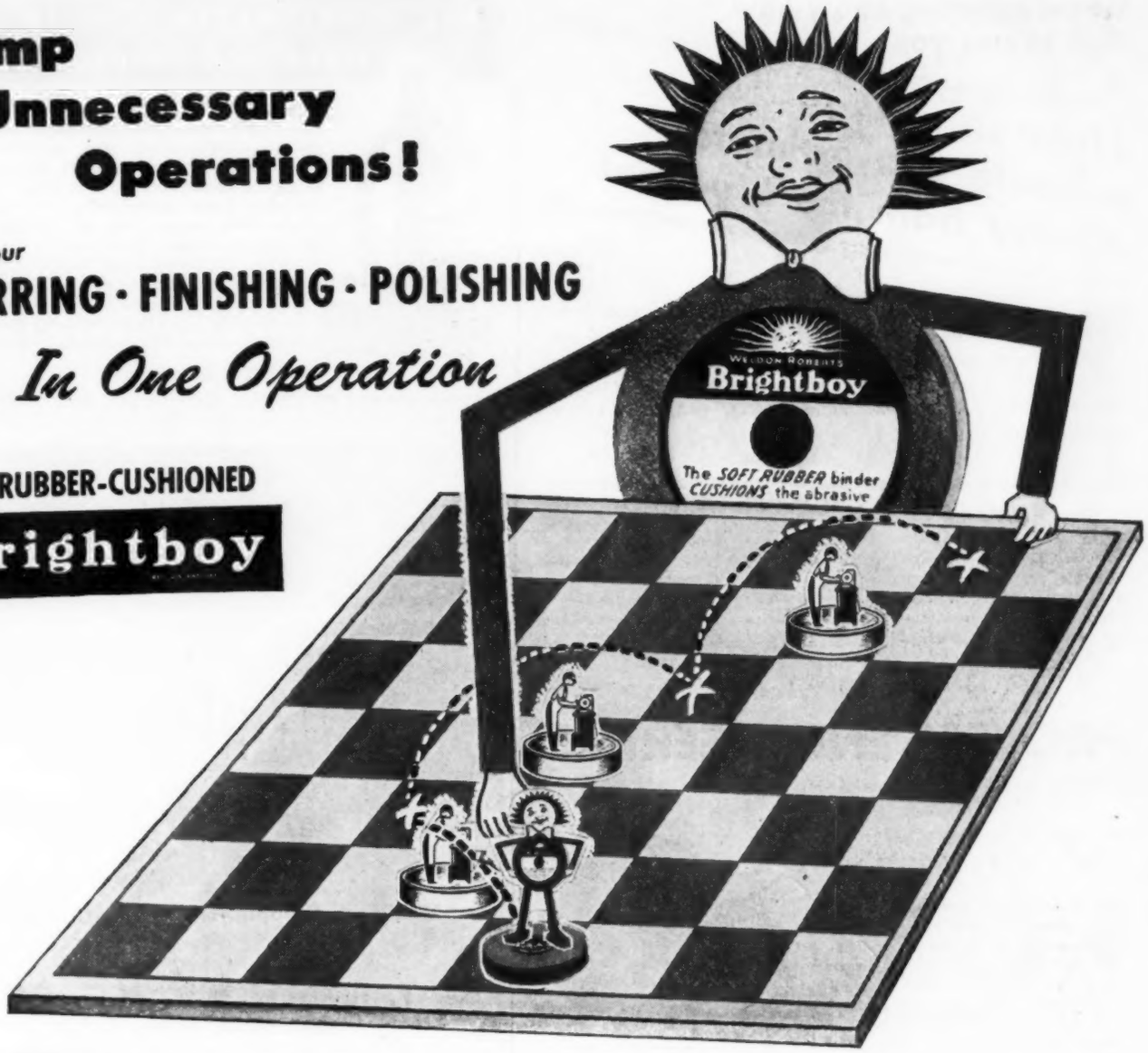

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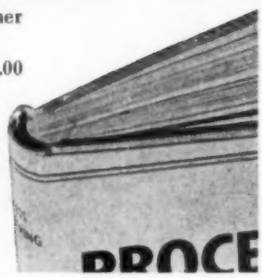

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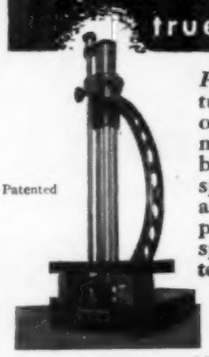

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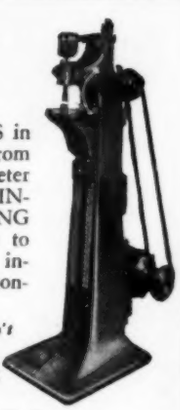

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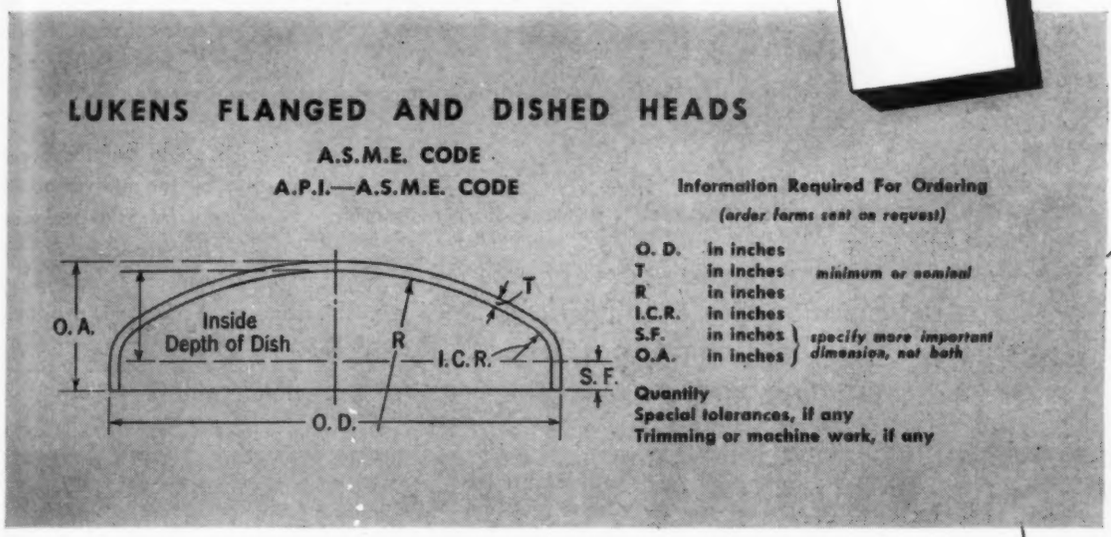

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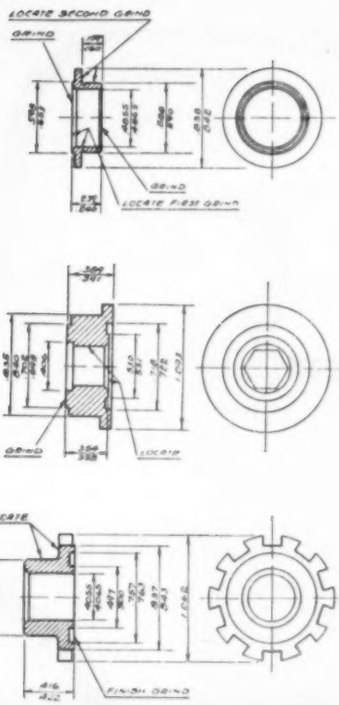

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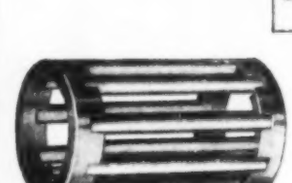

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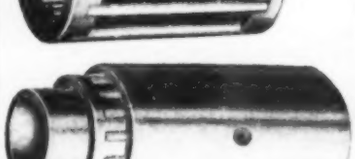

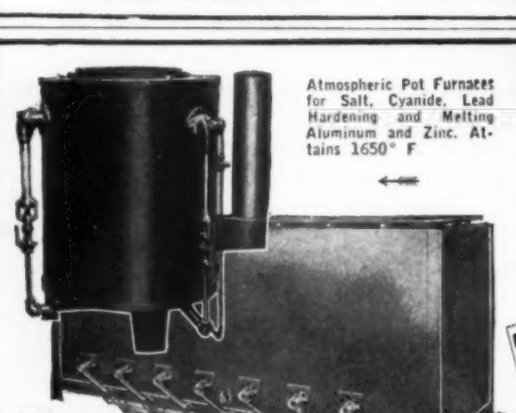

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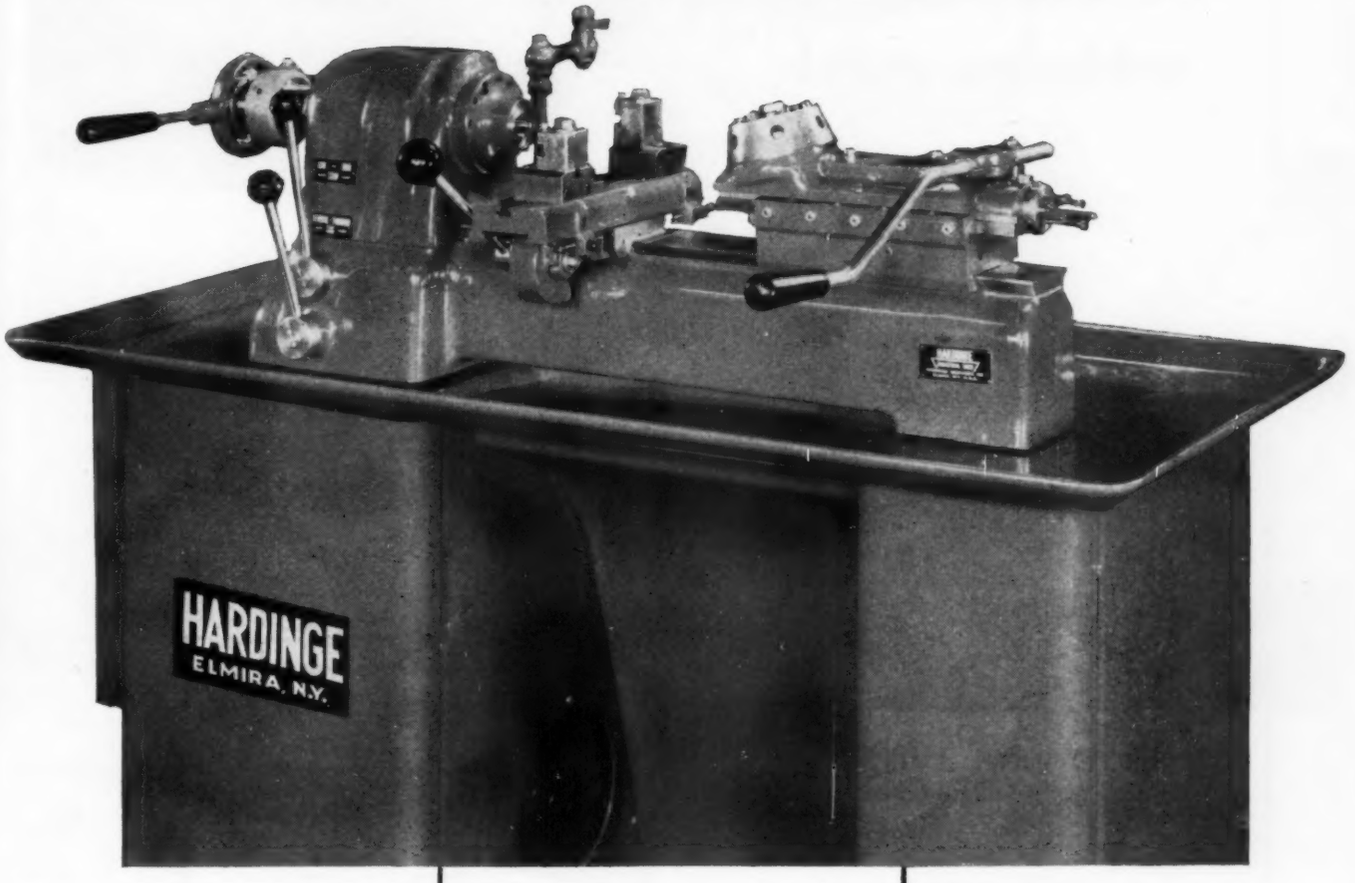

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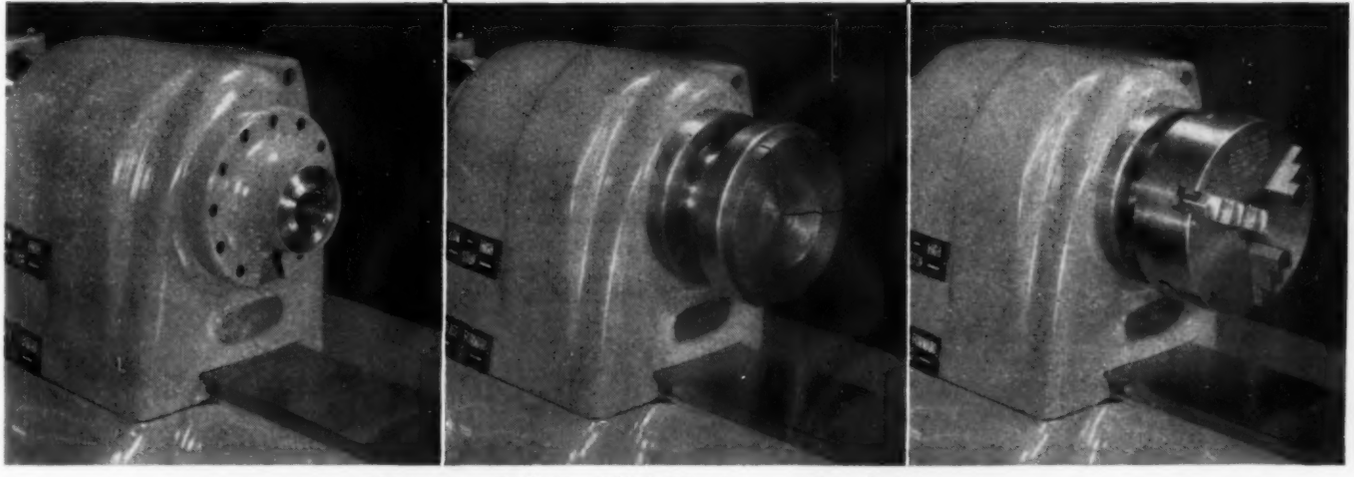

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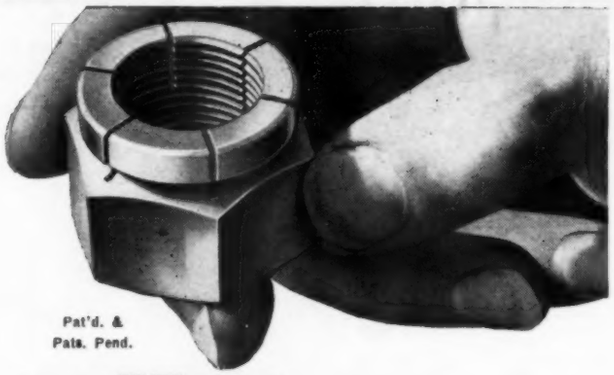

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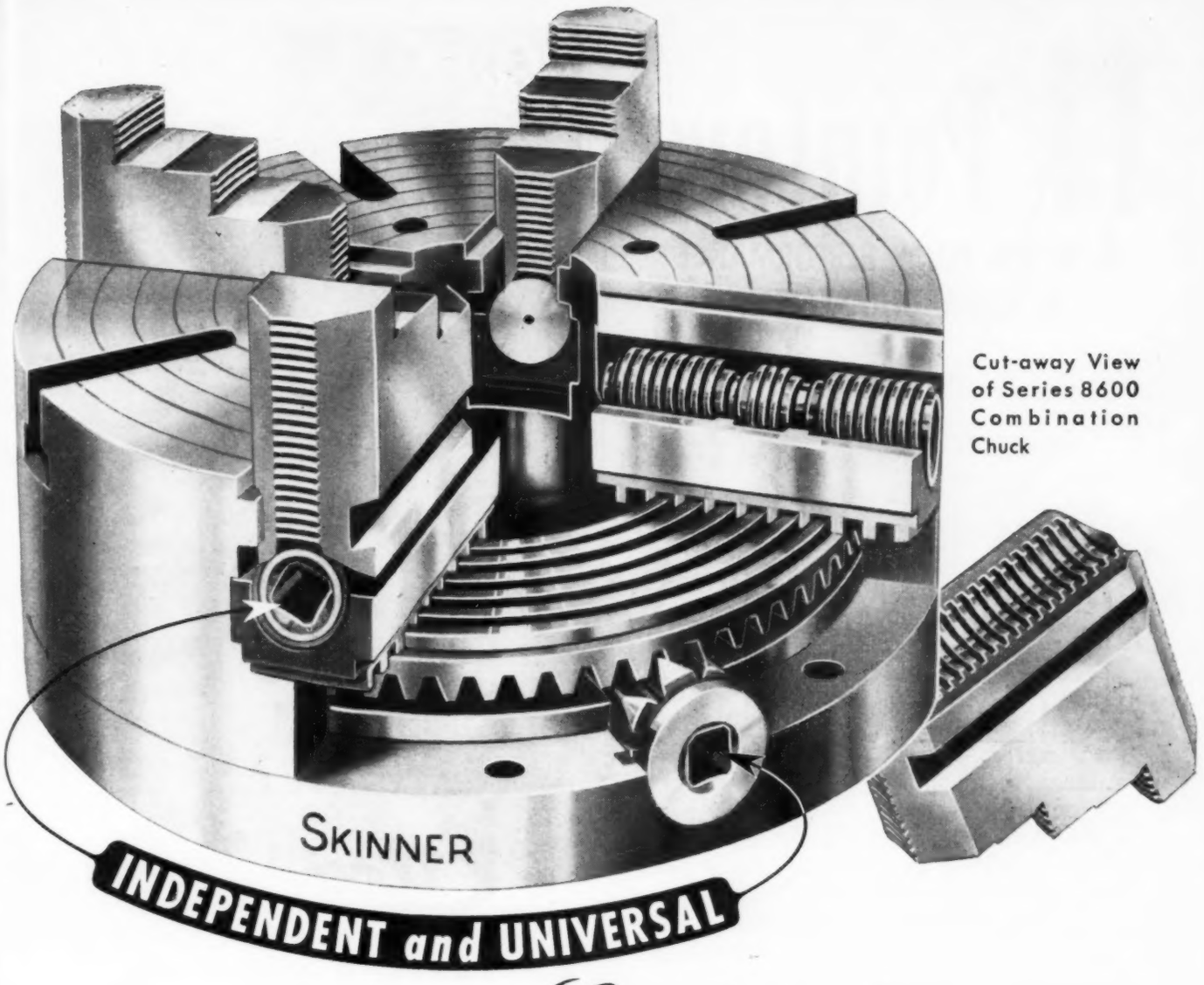

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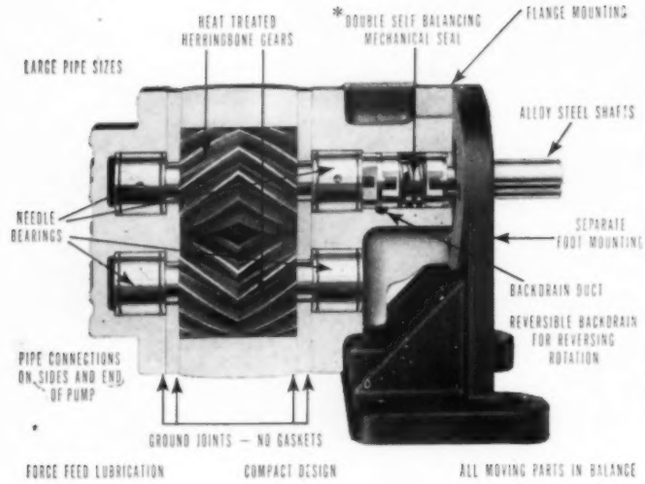

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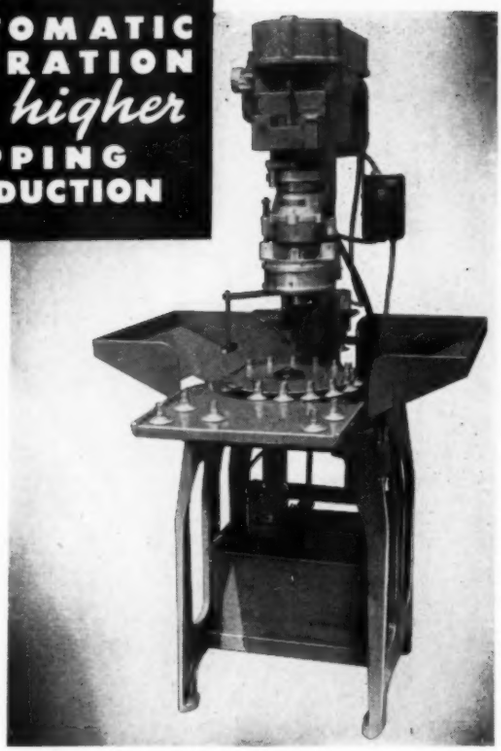

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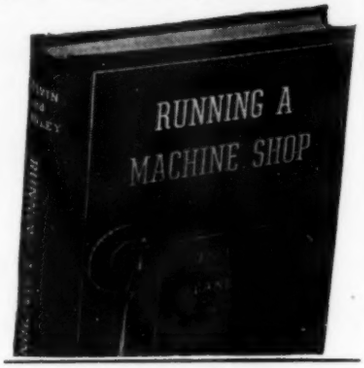

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IN SMALL LOTS

DAYTON ROGERS MFG. CO.
Minneapolis 7, Minnesota

PATTERNS in WOOD and METAL
For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY
Put your pattern problems up to us – we will take care of them.
GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

KAMIS Engineering Company

Designers & Manufacturers of Tools & Machinery

Special machine work; facilities available for production quantities of small, medium and large machined parts, assemblies and fabrications. Specializing in stainless steel aviation gas turbine parts.

Send for Brochure No. 3 which describes our facilities in detail.

300 MOORE STREET
PHILADELPHIA 48, PA.

SEARCHLIGHT SECTION

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

DISPLAYED RATE

(Not available for equipment advertising)

90¢ per line, minimum 4 lines. To figure advance payment count 5 average words as a line.
POSITIONS WANTED (full or part-time individual salaried employment only), ½ above rates.
PROPOSALS, 90 cents a line an insertion.

INFORMATION

BOX NUMBERS in care of any of our New York, Chicago or San Francisco offices count 1 line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

The advertising rate is $9.00 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches to a page. A.M.

NEW ADVERTISING received by 10 A. M. October 5th will appear in the issue of October 21st subject to limitation of space available

REPLIES (Box No.):
Address to office nearest you.
NEW YORK: 330 W. 42nd St. (18)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

MECHANICAL ENGINEER—Opening in Chattanooga. Should have at least two years experience in design and drafting, and be capable of checking drawings for accuracy. Opportunity offered for developing into Product Engineer. Write full details of qualifications and enclose photos, (non-returnable). P-6504, American Machinist.

ELECTRICAL SUPERINTENDENT. Large steel plant Pittsburgh District requires services of experienced electrical superintendent to supervise electrical personnel and maintenance of electrical equipment. State age and salary expected. P-6638, American Machinst.

SHOP SUPERINTENDENT. Large steel plant Pittsburgh District wants shop superintendent with qualifications to supervise machine, pattern, blacksmith, boiler, bridge shops, iron foundry and miscellaneous shop. State age and salary expected. P-6637, American Machinist.

WANTED: FOREMAN, tool room employing five men. Factory itself, 125 men. Products, miscellaneous farm equipment items. Also some job press work. Necessary to design dies and fixtures and supervise their fabrication for some 35 mechanical presses, toggle presses, press brakes, and air cushion presses ranging from 5 tons to 250 tons capacity. Give experience, age, family status and salary required. P-6584, American Machinist.

POSITION VACANT

WANTED—MASTER die and toolmaker—must be familiar and experienced in the cutting of embossing dies as well as the making of deep drawing metal shells and thread rolling equipment for hollow ware. Splendid opportunity to become interested in a going business. Give detailed experience. P-6630, American Machinist.

SELLING OPPORTUNITIES OFFERED

DIAMOND TOOL and Diamond Wheel manufacturer wants representatives throughout the U.S. must be familiar with principles of grinding. Furnish references and experience in application. RW-6249, American Machinist.

MFG. AGENTS for complete end mill line. Must have allied lines. Successful background cutting tools. Territories open: Illinois, Wisconsin, Missouri, Texas, New England, West Coast RW-6335, American Machinist.

EMPLOYMENT SERVICES

SALARIED POSITIONS $3,500-$35,000. If you are considering a new connection communicate with the undersigned. We offer the original personal employment service 38 years recognized standing and reputation. The procedure of highest ethical standards is individualized to your personal requirements and develops overtures without initiative on your part. Your identity covered and present position protected. Send only name and address for details. R. W. Bixby Inc., 266 Dun Bldg., Buffalo 2, N. Y.

ADDITIONAL EMPLOYMENT ADVERTISING ON PAGE 278

INDUSTRIAL ENGINEER

with long experience in manufacturing industries interested in connecting himself with a Gear & Pump Manufacturing Co. Write stating experience, educational background, salary desired.

P-6503, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

SALES ENGINEER

Gear manufacturer wants representatives for following states. Must be familiar with mechanics of precision gears.

Give complete personal and background details, reference and experience in application.

NEW ENGLAND; NEW YORK STATE
PENNSYLANIA; MARYLAND; TEXAS
OHIO; ILLINOIS; MICHIGAN

S. W. 4544, American Machinist
330 W. 42nd St., New York 18, N. Y.

TOOL & PLASTIC ENGINEER

Age 42, married and presently employed as "Chief Engineer" in charge of plastic molding, die casting, and all tool engineering including plastic molds, die casting dies, stamping dies of all types, and jigs and fixtures. Available after November 1st, 1948.

P.W.-6607, AMERICAN MACHINIST
520 N. Michigan Ave., Chicago 11, Ill.

AVAILABLE

Top notch man for research, development, design. Sales minded and production conscious.

Wide and unusual experience, domestic and abroad. Metal-, woodworking-, paper-machinery, etc.

Full or part time position, preferably east of the Mississippi.

P.W.-6625, AMERICAN MACHINIST
330 W. 42nd St., New York 18, N. Y.

POSITIONS WANTED

CHIEF ENGINEER or assistant position. Twenty years experience in all matters pertaining to the design and development of industrial and consumer products. Thorough knowledge of manufacturing methods. Wide experience in originating and developing successful new products, modernizing existing lines and supervising detailing for practical mass production. Electric appliances, power tools, mechanical and electrical devices. College graduate, age 45. PW-6502 American Machinist.

PRODUCTION EXECUTIVE: Metal stampings; screw machine products; castings. High speed progressive die, and deep drawn stampings. Parts assembly. Lacquered; painted, and plated finishes. Unusual ability to handle labor. PW-6615, American Machinist.

PLANT SUPERINTENDENT—Manager, M.E. background. 20 years experience in design, manufacturing, labor relations, management. Good record, efficient, reliable, desires responsible position in small or medium size company. PW-6515, American Machinist.

SELLING OPPORTUNITIES WANTED

MANUFACTURER'S REPRESENTATIVE with excellent contacts in all New England States can handle one more major machinery line on straight commission. RA-6531, American Machinist.

SHOP MANAGER: 36, thoroughly familiar with Metropolitan New York and Long Island wants to represent machine manufacturer in demonstration, installation and sales follow-up. If you need a man with a thorough machine shop background for this type of work reply to Box 149, Ashley, Ohio.

BUSINESS OPPORTUNITY

Mechanical Engineer
with considerable shop, design and sales experience has $15-20,000 to invest in going manufacturing firm where services could be utilized to advantage. BO-6290, American Machinist.

PATENT ATTORNEY

Patent Practice
before U.S. Patent Office. Validity and infringement investigations and opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine and Rommel Registered Patent Attorneys. Suite 453, 815-15th Street, N. W. Washington 5, D. C.

FOR SALE

Tool and Die shop, completely equipped, enjoying a good return on investment, together with 1 acre of land, modern house and garage—automatic heat and air conditioning throughout. For further particulars contact,

H. D. McCLURE
337 Glendale Ave., Rockford, Illinois. Phone 3-3234

PROFESSIONAL SERVICES

WALTER C. REED
Consulting Engineer
(Formerly of General Electric Co.)
Brazing, Soldering Alloys & Fluxes
Metal Joining Methods
DALTON, MASS.

WE ARE IN THE MARKET FOR YOUR SURPLUS

METAL CUTTING TOOLS

DRILLS, TAPS, DIES, REAMERS, MILLING CUTTERS, HACKSAW BLADES AND FILES

SEND US YOUR LIST

DeWITT TOOL CO.

173 GRAND STREET **NEW YORK CITY 13, N. Y.**

EQUIPMENT WANTED

Sykes Herringbone Gear Cutting Machine Type 3-C. Must be in excellent condition and not more than 10 years old. Price must be reasonable.

SIER-BATH GEAR & PUMP CO., INC.
9252 Hudson Boulevard
North Bergen, New Jersey

WANTED
(1) CINCINNATI #5 or #6, or MILWAUKEE 5H or 5K, or TYPE C5 VERTICAL MILLER
Must have high range of spindle speeds
Wire or call collect
R & H MACHINERY, INC.
84 Prescott St., Worcester 5, Mass.

WANTED BY PRIVATE PARTY
DALTON "SIX" LATHE Attachments and Parts
Such as Thread Dial, Taper Attachment, Steady and Follower Rest, Chucks, etc., replacement Lead Screw or other parts. • If available, please give condition and quote. Might consider complete lathe.
R. A. BREWER, FRANKLIN, MICHIGAN

ANYBODY CAN BUY* IN THIS SPOT-BID SALE OF

MACHINE TOOLS & INDUSTRIAL EQUIPMENT

Twenty-eight lots offered free of priorities, including:

195,757 lbs.	Open-Hearth Steel, Flat, bar.
189,450 lbs.	Strip Steel, ⅞" wide, #14 gauge.
111,933 lbs.	Tool Steel, random lengths
34,961	Connection Blocks, 4 post-Bakelite, Rosette Type
30,153	Bronze Bars & Rods, various sizes
21,240 lbs.	Stainless Steel, Nickel, Chrome, SAE 3140
8,425 ft.	Welding Cable, one conductor
4,015 ft.	Stranded Cable, type YK-3260
416 pcs.	Threaded Conduit, 3" black steel, 10' long
191	Condenser Tube Inserts, plastic
103	Gauges, oil, water.
39	Blowers, Hiventors, portable
29	Control Panels, 6½"x9"x6⅜"
24	Relays, various
21	Jacks, 25 to 400 ton capacities
17	Platform Trucks, various sizes
6	Boring Bars, for cylinders
5	Transformers, for arc welding (also other transformers)
4	Concrete Mixers
4	Acetylene Regulators, Airco Style 606-8402
3	Burring Machines, Niagara #147-B
3	Pedestal Grinders, Standard Electric Tool Co.
2	Electric Magnets, 230 V. D.C., Size R4, Cutler-Hammer, Inc.
1	Hydro-Pneumatic Press, 20 tons on ram; 1 Mill Stone, 8" Size; 1 Mixing and Kneading Machine (Kent Machine Works);
1	Centrifugal Pump, Marlow self-priming, 8000 gal. per hour;
1	Steam Windless, with wildcat and capstan and other items.

BIDDING BEGINS—10 A.M., OCTOBER 26 AT EDDYSTONE

Materials may be inspected at the Sun Shipbuilding and Dry Dock Corp., Eddystone, Pa., 9 A.M. to 2:30 P.M., Mondays through Fridays, September 27 to October 26.

Catalog Listing PHX-OL-862, containing description and terms of sale, will be available at the sale site in Eddystone or the Philadelphia WAA Regional Office, Lafayette Building, 5th & Chestnut Streets, Philadelphia 6, Pa.

Donation requests from eligible institutions will be accepted during the inspection period; and donations made therafter.

*The priorities established by the Surplus Property Act are no longer in effect for personal property, and all buyers participate on an equal basis.

Property in this sale may be withdrawn up to the time of a sales contract, for National Defense, Disaster Relief and other special programs established by legislation.

SUN SHIPBUILDING AND DRY DOCK CORP.
No. 4 Yard, 2nd Street and Saville Avenue
Eddystone, Pa.
Telephone: Chester 3-6302

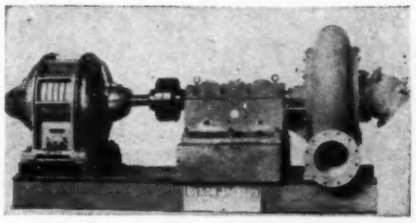
PH-1501

BUY FROM STOCK
Telephone
MAIN 6347-6348

FALK
MACHINERY COMPANY

18 WARD ST.
ROCHESTER 5
N. Y.

Every Item Guaranteed as Represented



Nebel 20"-40"x8' Geared Head Quick Change Gear Extension Bed Gap Lathe. 3/60/220 volts motor driven. Taper Attachment, faceplates, chuck, tailstock, plus Hexagon Turret with power feed. Immediate delivery.

ENGINE LATHES

36"x30' LeBlond, Geared Hd. Motor Dr.
32" x 28' Bridgeford, Geared Head, M. Dr.
32"x16' Bridgeford, Geared Head, M. Dr.
28"x10' Davis Quick Change Gear
26"x18' Bridgeford, Geared Head, M. Dr.
25"x14' LeBlond, Motorized
24"x18' American Q.C.G. Grd. Hd. 11' centers, Taper Attach. Motor Dr. Equipment
24"x14' Lodge & Shipley, Motorized
24"x16' American Motorized
24"x12' Putnam, Quick Change Gear
24"x10' LeBlond, Quick Change Gear
21"x18' Leblond, Motorized
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers
20"x10' Hendey, Q.C.G. motor dr.
20"x8' Lodge & Shipley, Q.C.G. M. Dr.
18"x10' American Geared Head
18"x10' Davis, Q.C.G. M. Dr.
18"x8' Davis Q.C.G. 42" centers, equipment
18 x8' Lodge & Shipley, geared head
18"x8' Hendey Q.C.G. 49" centers
18"x7' Lehman, Q.C.G. M. Dr.
18"x6' American, Geared Head, MD.
16"x8' Hendey, Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head
14"x8' Rockford, Q.C.G. Collets
14"x6' LeBlond, Q.C.G. M. Drive
14"x6' Mulliner-Endlund, M. Drive
14"x6' Hendey, Q.C.G. M. Drive
14"x6' Rockford, Q.C.G. M. Drive
13"x5' South Bend Q.C.G. 30" centers
12"x30" American, Wood Spinning
12"x5' Sidney, Geared Head
12"x5' Hendey, Q.C.G. M. Drive
12"x5' Sebastian Q.C.G. Grd. Hd.
12"x3' Craftsman, Bench, M. Drive
12"x18" Porter-Cable Carbo-Lathe
11"x4' Sidney, Q.C.G. Floor Type

TURRET LATHES

Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed, 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Gisholt #4 Univ. 2" cap., M. Dr.
W-Swasey #2A Univ. 2½ ' Cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 3½" cap., M. Dr.

BENDING ROLLS

San Angelo, initial type 6' x 16 ga.
Niagara, initial type 12' x ⅛"
Hendley-Whitmore 6' x 3/16"
Dekom Angle Bending, 3 x 3 x ⅜, M. Dr.

METAL ROUTERS

Onsrud Double Spindle Radial Arm #A2DD, 108" Arms with frequency Converter for 3/60/220
Onsrud Model #W-255 Single Spindle Router. Swivel head with front & rear travel.

New & Used Motors
All Sizes IN STOCK

GRINDING MACHINES

J & L #TG-615 Automatic Thread, M. Dr.
Norton 6x18 Vert. Surface, Excello Spindle
Norton 6x18 Horiz. Surface, Excello Spindle
Brown & Sharpe #2 Auto. Surface, 6x18
Pratt & Whitney 14x36 Vertical Surface
Blanchard #16, 30" Vertical Surface
Thompson Hydraulic Horiz. Surface
Abrasive Automatic Surface, 22x8
Reid #2 Automatic Surface, 6x18
Norton Hydraulic Horiz. 6x36
Heald #25 Rotary Surface
Seybold 96" Knife, belt driven
Brown & Sharpe #2 Face, motorized
Rivet #3 Internal, Cone driven
Heald #70 Internal, Belt drive
Heald #60 Internal, Belt drive
Norton #2 Univ. Tool & Cutter, Belt Dr.
Cincinnati #1½ Univ. Tool & Cutter, Belt Dr.
Oakley #3 Tool & Cutter, Belt Dr.
G & Livingston #4 Tool & Cutter
Cincinnati #2 Tool & Cutter, M. Dr.
Cincinnati "Monoset" Tool & Cutter
Cincinnati #2 Centerless, M. Dr.
Gorton Dble. End Disc, 18" dia. discs
Besley Dbl. End Disc, 30" dia. discs
Greenfield #12 Internal Hydraulic
Cincinnati #2 Univ. Cylindrical 6x36
Brown & Sharpe #10 Cylindrical 6x18
Brown & Sharpe #11 Cylindrical 10x30
Brown & Sharpe #4 Univ. Cylindrical 12x60
Brown & Sharpe #5 Plain Cylindrical
Oliver of Adrian #51 Drill Grinders

AUTOMATICS

No. 0 & No. 00 Brown & Sharpe
No. 0 Brown & Sharpe Automatic Cutoff
#2 Brown & Sharpe High Speed Automatic. Turner Drive.
1—1¼" Cone 4-spindle Automatic M.D. Threading Spindle
Cleveland Model "A" 3¾" Single Spindle. Motor driven.

PUNCH PRESSES

Caldwell 200 tons Horiz. Hydr. Wheel Press.
Ferracute No. EG52 Coining Press. 150 tons. Up moving ram. 2¼" Stroke
General Flexible Power Press. 8 tons, M. Dr.
Stiles O.B.I. 14 tons, 1½" stroke.
Michigan O.B.I. 36 tons cap. 2" stroke. Wide Ram, wide Bed. Motor driven
Bliss No. 68C Dbl. Action, Gap Frame.
Lucas 15 tons, Power Arbor Press. M. Dr.
Hub O.B.I. 15 tons, 2" stroke, M. Dr.
Tompkins & Johnson Power Arbor Press. 3½" Stroke. Cap. 6500#
McCall No. 4 O.B.I. 2½" stroke, 25 tons.
NEW Johnson O.B.I. Presses. All sizes.
Bliss #305 Geared S.S. Single Action
Bliss #109 Slitter, 10 ga. cap.
Nilson 56 tons S.S. Dbl. Crank 3-Die Transfer Press
Bliss #18, #20 O.B.I. Motorized

SHEARS

Hilles & Jones #4 Single End
Bliss #109 Slitter, 10 ga. cap.
Pexto #571 Slitter, 3/16" cap.
Wais & Roos 10' x ¼", 15' gap
Ohl 6'x14 ga. Cap. Squaring
NEW Famco 36"x18 ga. Squaring
Pexsto Foot squaring 30" x 22 ga.

Sutton #2 Straightening Machine. Cap. ¾" to 3½" tubes or solids. 50 h.p. 3/60/220 volts motor drive.

BROACH

Oilgear, Horizontal Hydraulic Type #XA. Capacity —20,000#, 56" stroke. Motor driven. Coolant system and hydraulic system.

MILLING MACHINES

Vernon #0 Hand, Late Type, M.D.
Nichols Hand, Late Type, M.D.
Sundstrand #0 Rigidmil, M.D.
Whitney #6 Hand, Cone Drive
Hardinge B.B. Vertical, Bench
Bickett #1 B.B. Vertical, Bench
Ames Universal Horiz. Bench
Becker #5C Vertical, Cone Dr.
Knight #1½C Vertical
Cincinnati #3 & #4 Vertical
Cincinnati #2 Univ. Horizontal
Cincinnati #3S Univ., Horizontal
Cincinnati #3, #4, #5 Pl. Horiz.
Cincinnati #2M Univ. Horiz.
Brown & Sharpe #0, 1, 1Y Horizontal
Brown & Sharpe #2 Univ. Horiz.
Brown & Sharpe #1D Univ. Horiz.
Brown & Sharpe #3 Univ. Horiz.
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain
Garvin #14 Plain Horizontal
Milwaukee #2K Vertical, M. Dr.
Milwaukee #3K Verical, M. Dr.
Milwaukee #1½ Dbl. Overarm, Horiz.
Milwaukee #2B Dble. Overarm, Horiz.
Milwaukee #2B Universal Horiz.
Milwaukee #3B Plain Horizontal
Brown & Sharpe #12 Production, M. Dr.
Pratt & Whitney #2 Duplex, Motorized
Van Norman #2 Duplex, Motorized
Cincinnati #0-8 Vertical, M. Dr.
Cincinnati #0-8 Plain Automatic
Cincinnati #0-8 Rise & Fall
Cincinnati #2-18 Plain Automatic

Cincinnati #5 Horizontal Hi Power Milling Machine. With rectangular overarm. All geared speeds & feeds. Single pulley drive. Range—50'x14"x21". Immediate Delivery, (2 Available.)

SHAPERS & PLANERS

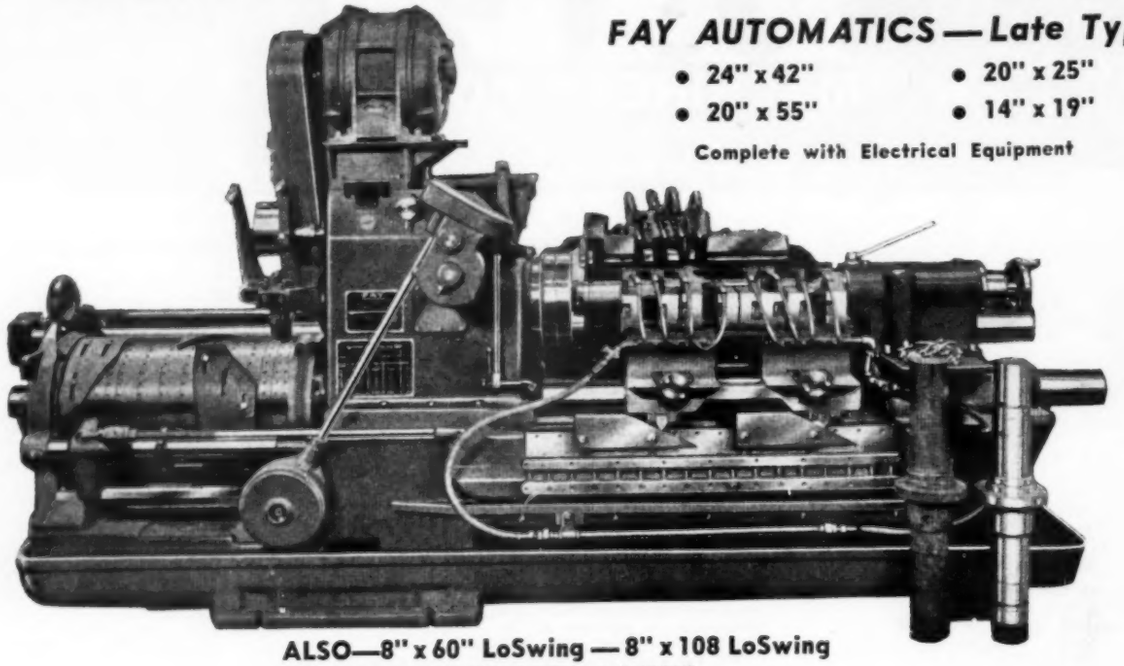
Shaper—Pratt & Whitney Vertical 6" with Rotary table & motor drive.
Shaper—Logan 7" Horizontal. NEW
Shaper—Machinery Sales 16", motorized
Shaper—Gould & Eberhardt 16", motorized
Shaper—Smith & Mills 16", motorized
Shaper—Smith & Mills 16" Universal
Shaper—Potter & Johnston 16", Universal
Shaper—American 24" crank, motorized
New Haven 12" Slotter, motorized
Planer—Whitcombe 24x24x6 motorized
Planer—Shaper—Niles-B. Pond 20x20x24
Planer—Betts 72x60x30 Modern 4-Head
Planer—Betts 72x60x25 Modern 4-Head
Planer—Betts 122x72x34 Modern 4-Head

DRILLING MACHINES

American 8' Triple Purpose Radial, M.Dr.
Cinci-Bickford 6' Arm, 15" col. Radial
Cinci-Bickford 5' Arm, 13" col. Radial
Demco 4-Spindle Drill #2 M.T. M. Dr.
Fosdick 5" Arm 14" col. Radial
Natco #12, 20 Spdle Multiple, 3/16" cap.
Fox #15, 54 Spdle. Multiple, #1 M.T.
Minster #2D Single Spindle Upright Heavy Duty. 2½" cap. Compound Table. Motorized
Canedy-Otto 21" Single Spdle. Late Type
Cinci-Bickford 21" Drilling & Tapping, #3 m.t.
Buffalo Forge #2MS Drill. Late Type
Barnes 22" Backgeared Upright Single Spdle.
Leland-Gifford #2MS, 2-Spindle Upright
Edlund #2B, 4-Spindle Upright, #2 m.t.
NEW Buffalo Forge #15, #18 Single Spdles.

Bradley 200# Rubber Cushioned Helve Hammer. Single pulley drive. 225 to 240 blows per minute. Stroke adjustable from 1" to 5½". Separate adjustable anvil. Total weight—10,200#. Price—$1850.00 net fob Rochester, N. Y.

EMERMAN OFFERS FROM STOCK



FAY AUTOMATICS — Late Type

- 24" x 42"
- 20" x 25"
- 20" x 55"
- 14" x 19"

Complete with Electrical Equipment

ALSO—8" x 60" LoSwing — 8" x 108 LoSwing
10" SUNDSTRAND AUTO. LATHES
6" SUNDSTRAND BRAKE DRUM LATHE

EMERMAN MACHINERY CORP. 875 W. 120th ST. CHICAGO 43, ILL.

LATEST TYPE
Pratt & Whitney
14" x 60"
HYDRAULIC VERTICAL SURFACE GRINDER

Like New

OTHER FINE MACHINE TOOLS IN STOCK

72" N-B-P Vert. Boring Mill.
60" Cincinnati Vert. Boring Mill.
48"x30' N-B-P Lathe, M. D.
12" Oster-Williams Pipe Machine.
4' American "Hole Wizard" Radial Drill, '42.
20" Smith & Mills Univ. Shaper, Power Down Feed, '42.
2—#2G B&S High Speed Automatics.
16"x54" c.c. Lodge & Shipley lathe.
2—#2G Kempsmith Univ. Millers, '43.
16"x33" Fay Auto. Lathe, '42.
14"x30" Bradford "Metalmaster" Lathe, never used.
#2H Kearney & Trecker Vert. Mill, '42.
#4 Cincinnati Plain Mill, Rect. Arm.
4—#2M Cincinnati Plain Millers, Timken, mtr. in base.
3—#000 B&S Production Mills, '42.
12"x36" Norton "C" Univ. Cyl. Grinder, '41.
14"x40" B&S #3 Univ. Cyl. Grinder, '42.
6"x30" Norton "C" Plain Cyl. Grinder, '42.
7" Peerless Hydracut H.S. Power Hack Saw, 1942.
#91A Covel Univ. Tool & Cutter Grinder, 1942.

EVERYTHING FROM A PULLEY TO A POWERHOUSE

THE O'BRIEN MACHINERY CO.
PHILADELPHIA'S LARGEST MACHINERY DEALERS AND EXPORTERS
113 NORTH THIRD STREET -- PHILADELPHIA 6, PENNA.

BARGAINS!
SURPLUS EQUIPMENT

AJAX 1½", 3½", Heading and upsetting, MV.
BRIDGEFORD 36x24' Centers Engine Lathe, Motor Drive
BULLARD 16" 6 and 8 spindle Mult-au-matic Type D Single Indexing, New 1943
CINCINNATI #3 centerless grinder, MD.
CINCINNATI #3, #4 Vertical Milling Machine, Geared Motor Drive
CRANES from 5 to 30 ton capacity all 230 volts, DC current
FRANKLIN 4¼" Bar Horizontal Boring Mill Table Type Motor Drive
JONES & LAMSON "Fay" 20x25 Centers Production Lathe, New 1941
LoSWING 8x108" Centers Production Lathe, New 1941

NIAGARA 1000, 1200 KVA Transformers, New 1941

NILES 30x50' Bed Boring Lathe, New 1941
NILES 72x63' Centers, Combination Boring and Turning Lathe, Motor Drive
SUNDSTRAND #3A Duplex Miller—40" feed, New 1941
VAN NORMAN #3 Duplex Universal Milling Machine

CINCINNATI No. 4 Plain Milling Machine, Geared, Timken Bearing
KEARNEY & TRECKER No. 4 Plain Milling Machine, Geared, Timken Bearing
WARNER & SWASEY #5 Universal Turret Lathe, Timken, Bearing

This is a partial listing.

HARRISON MACHINERY EXCHANGE, INC.
South 4th St. Harrison, N. J.
10 minutes from New York City—5 minutes from Newark, N. J.
Tel.: HUMBOLDT 2-5750, 2-5775

THE LARGEST MACHINE TOOL PLANT IN THE U. S. A.

Eastern OFFERS FROM STOCK

DEVOTED EXCLUSIVELY TO REBUILT MACHINERY

ENGINE LATHES

10x20" centers Monarch EE Geared Head, m.d., Latest
10x24" Logan, cone, motorized
12"x36" centers Lodge & Shipley Selec. Head, m.d., taper, relieving
13x30" centers Pratt & Whitney Model B, m.d., taper
13x48" centers Pratt & Whitney Model B, m.d.
14"x30" centers American "Pacemaker", m.d., latest
14x30" centers Lodge & Shipley Selec. Head, m.d., Latest
14"x54" centers Bradford Geared Head, m.d., taper
14"x6' bed Hendey Geared Head, m.d., taper
14"x6' Pratt & Whitney, cone
14"x6' LeBlond, cone
14"x6' Sidney Geared Head, m.d.
14"x8' American Geared Head, m.d.
14"x8' Cincinnati Geared Head, m.d.
14"x8' Pratt & Whitney, cone
15"x6' LeBlond Geared Head, m.d.
16"x36" centers Pratt & Whitney Type B Geared Head, m.d., taper
16"x6' Hendey Geared Head, m.d.
16"x6' Hendey Yoke Head, Taper
16"x6' Lodge & Shipley Selec. Head, m.d.
16"x30" centers Monarch Geared Head, m.d.
16"x10' Hendey Yoke Head, taper
17"x6' LeBlond Geared Head, m.d.
17"x12' LeBlond Geared Head, m.d., taper
18"x52" centers American Geared Head, m.d., taper
18"x6' Hendey Yoke Head
18"x7' Hendey Geared Head, m.d., taper
18"x8' American Geared Head, m.d.
18"x8' Lodge & Shipley Selec. Head, m.d.
18"x8' Lodge & Shipley Cone head
18"x8' Whitcomb-Blaisdell Geared Head
18"x10' Cincinnati, cone
18"x10' Lodge & Shipley Selec. Head, m.d.
19"x19' LeBlond Geared Head, m.d.
20"x8' American Geared Head, m.d., taper
20"x10' Sidney Geared Head, m.d.
21"x18' LeBlond, cone
22"x70" centers Greaves-Klusman Geared Head, m.d., taper
22"x8' Lodge & Shipley, cone
23"x12' LeBlond Geared Head, m.d., taper
24"x10' American, cone
24"x10' Greaves-Klusman Geared Head, m.d., taper
24"x10' Hendey Geared Head, m.d.
24"x10' Lodge & Shipley, cone
24"x12' Bridgeford Geared Head, m.d., taper
24"x12' Monarch Geared Head, m.d., taper
24"x14' Boye & Emmes, cone, taper
24"x24' American, cone
25"x60" centers Boye & Emmes Geared Head, m.d., taper, 1942 machine
26"x12' Bridgeford Geared Head, m.d., taper
30"x12'6" Niles-Bement-Pond, m.d., taper
32"x12' Lehmann Hydratrol Geared Head, m.d., taper, late
36"x12' Lehmann Hydratrol Geared Head, m.d., taper, latest
36"x32' centers Putnam Geared Head, m.d.
36"x36'6" Niles Heavy Duty, m.d., latest, 2 carriages
50"x204" centers LeBlond Geared Head, m.d., taper, latest

MANUFACTURING LATHES

No. 4 LeBlond Boring Lathe, 37' bed, 13" hole
No. 9, 12 LeBlond Multi-Cut, m.d.
3½x36", 3½x80", 4x60", 8x84", LoSwing, m.d.
8x132" LoSwing, m.d., latest
9x12" Sundstrand Mfg., s.p.d.
11x18" LeBlond Rapid Production, m.d.
13x24" Coulter Automatic Threading, m.d.
13x24" LeBlond Rapid Production, Timken, latest
13x36" LeBlond Rapid Production, Timken, latest
13x48" Coulter Automatic Threading, m.d.
17"x8' LeBlond Rapid Production, m.d.
17"x8' LeBlond Automobile Mfg., m.d.
20"x8' LeBlond Mfg., m.d.
Niles-Bement-Pond Quartering Machine, m.d., new
Schauer Type NA 2B Speed Lathe, m.d.

PLAIN MILLING MACHINES

No. 000 Brown & Sharpe, m.d., latest
No. 1A Millwaukee, m.d.
No. 1M Cincinnati, m.d.
No. 1½, 2, 3 Cincinnati, cone
No. 2B Brown & Sharpe, m.d., latest
No. 2 Cincinnati H.S. Dial, m.d., latest
No. 2L Cincinnati, m.d.
No. 2HL Milwaukee, m.d., latest
No. 2 Rockford, m.d.
No. 3, 4 Kempsmith Plain Mexi-Miller, m.d.
No. 3B Milwuakee, m.d.
No. 3 Van Norman Duplex, s.p.d.
No. 4 Cincinnati H.P., m.d.
No. 4 Cincinnati Medium Speed Dial, m.d., latest
No. 4 Ohio, cone
No. 5B Heavy Brown & Sharpe, m.d.
No. 5 Cincinnati, rect. overarm, m.d.
No. 5 H.D. LeBlond, s.p.d.

HAND MILLING MACHINES

No. 1 Standard, m.d.
No. 6 Whitney, m.d.
Atlas Model MF Bench, m.d.
No. 2 Productomatic, m.d.
No. 3 Garvin, m.d.

MANUFACTURING TYPE MILLING MACHINES

No. 00 Sundstrand Hydraulic Rigidmill, m.d., latest
No. 0-8 Cincinnati Model EA, m.d., latest
No. 12 Brown & Sharpe, m.d.
No. 1-12 Cincinnati, m.d., latest
No. 1-18 Cincinnati, m.d., latest
No. 2 Sundstrand Electromill, m.d., latest
No. 2-18 Cincinnati, m.d., latest
No. 2-18 Cincinnati, m.d., with rise & fall, latest
No. 2-24 Cincinnati, m.d., latest
No. 3-24 Cincinnati Plain Hydromatic, m.d., latest
No. 3-36 Cincinnati Duplex Hydromatic, m.d.
No. 4-48 Cincinnati Plain Hydromatic, m.d., latest
No. 56-72 Cincinnati Duplex Hydromatic, m.d., latest
No. 56-90 Cincinnati Duplex Hydromatic, m.d., latest
Type P Ohio Mfg., m.d.
No. 33 Kempsmith Mfg., s.p.d.
No. 34-36 Cincinnati Duplex Hydromatic, with tracer control, latest
No. 34-36 Cincinnati Plain Hydromatic, m.d., with tracer control, latest
Sundstrand Rigidmill, m.d.
4" Pratt & Whitney Spline, m.d.
18", 24" Cincinnati Plain Automatic, m.d.
24", 48" Cincinnati Duplex Automatic, m.d.
36"x24"x8' Ingersoll, 1 rail, 2 side head, m.d.
30"x36"x12' Ingersoll Slab, 2 heads, m.d.
72"x6' Ingersoll Single Horizontal Spindle Traveling Housing Milling Machine, m.d.
96"x22" Ingersoll, as above

UNIVERSAL MILLING MACHINES

No. 2 Cincinnati, cone
No. 2 Cincinnati Medium Speed Dial, m.d., latest
No. 3 Brown & Sharpe, cone, motorized
No. 3 Cincinnati Medium Speed Dial, with motor driven overarm, vertical attachment, latest
No. 3 Kempsmith, cone
No. 4A Brown & Sharpe, m.d.
No. 4 Cincinnati H.P., m.d.
No. 4G LeBlond, s.p.d.

THREAD MILLING MACHINES

No. CT-36, CT-54 Lees-Bradner, m.d., latest
Hall Planetary, m.d.
4½"x12", 6x14", 6x48", 6x80" Pratt & Whitney
10x24" Hansen-Whitney, m.d., latest

VERTICAL MILLING MACHINES

No. 08 Cincinnati, m.d., latest
No. 2M Cincinnati, m.d.
No. 2, 3, 4 Cincinnati H.P., m.d.
No. 2, 3, 4 Cincinnati High Speed Dial, m.d., latest
No. 2, 3 Cincinnati Medium Speed Dial, m.d., latest
No. 2H, 4H Milwaukee Dial, m.d., latest
No. 2HL Milwaukee Swiveling Head, m.d., latest
No. 2K, 3K, 4K Milwaukee Dial, m.d., latest
No. 2½B, 3B, 4 Milwaukee, m.d.
No. 3V Toledo, s.p.d.
No. 3V Van Norman, m.d., latest
No. 5 Brown & Sharpe, cone
No. 5 Jackson, m.d.
No. 5 Reed-Prentice, m.d., latest
No. 6 Becker, cone
Cincinnati Hydromatic, m.d., 2 spindles

PLANERS

P10 Coulter Crank Type Shaper-Planer, 1 head, m.d.
20"x20"x5' Whitcomb-Blaisdell Planer, belted m.d., 1 head
24"x24"x10' Whitcomb-Blaisdell, 2 heads, m.d.
30"x30"x10' Gray, 2 heads, belt
30"x30"x14' Gray, 2 heads, belt
32"x32"x16' Gray, 2 heads, belt
36"x36"x10' Cincinnati, 2 rail, 1 side head, belted m.d.
36"x36"x10' Niles, 2 heads, belt
36"x36"x16' Cincinnati, 4 heads, reversing m.d.
36"x36"x18' Niles-Bement-Pond, 2 heads, reversing m.d.
36"x36"x20' Cincinnati, 2 heads, belt
36"x36"x20' Gray, 2 heads, belt
38"x38"x20' Gray Spiral Drive, 2 heads, belt
42"x42"x26' Gray 2 heads, belted m.d.
48"x48"x12' Cincinnati, 2 heads, reversing m.d.
48"x48"x12' Gray Openside, 1 rail, 1 side head, reversing m.d.
48"x48"x18' Detrick & Harvey, 4 heads, reversing m.d.
48"x48"x28' Cincinnati, 4 heads, reversing m.d.
48"x48"x30' Cincinnati, 4 heads, m.d.
48"x48"x32' Niles-Bement-Pond, 4 heads, reversing m.d.
48"x48"x40' Sellers, 2 heads, reversing m.d.
62"x62"x40' Cincinnati, 4 heads, reversing m.d.
66"x60"x40' Niles-Bement-Pond, 4 heads, reversing m.d.
72"x72"x36' Niles, 4 heads, reversing m.d.
96"x72"x18' Pond, 4 heads, belted m.d.

PRESSES

Ferracute Double Crank, 36" between uprights, 84 ton cap.
No. 20 V. & O., m.d.
Studebaker 3P No. 205 Hydraulic Arbor, m.d.
Metalwood B3 and B45
Chambersburg 30 ton Hydro-Pneumatic

SHAPERS

48" stroke Heavy duty Morton H.D. Traveling Head Draw-Cut Shaper, m.d., with d.c. variable voltage equipment, 12' bed, latest type
24" Gould & Eberhardt Invincible, m.d.
24" Gould & Eberhardt High Duty, m.d.
24" Potter & Johnston, cone

SHEET METAL MACHINERY

No. 1 Savage Nibbler, m.d., 34" throat
Southwark Rotary Metal Cutter, 36" throat
Gray Turret Head Metal Cutter, cap. ¼", 36" throat
No. 2 Libert Nibbler, 28" throat
120" No. 100 Niagara Heavy Production Folder, 16 ga., m.d.

SLOTTERS

10" Newton, cone
12" Bement-Miles, m.d.
15" Canada, m.d.
20-24" Dill, m.d.
48" Niles-Bement-Pond Geared, m.d.

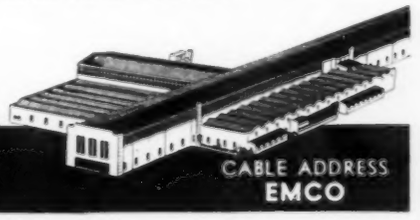
TAPPERS

No. 1, 2 Bakewell Precision, m.d.
No. 5 Webster & Parks, belt
No. 10 Kaufman High Duty Oscillating Pneumatic, m.d.

MISCELLANEOUS

Bear Precision Balancing, m.d.
Pratt & Whitney "Keller" Machine, model BL-2420, m.d., latest
40" Tolhurst Chip Wringer, m.d.
96" Ohio Extra Heavy Worm Feed Revolving Table, m.d.
Gisholt Precision Balancing Machine, m.d.
Detrick & Harvey 2 spindle Profiler
Morey No. 12M 2 spindle Profiler, latest
No. 20PH A.D. Cook Deepwell Pump with Chrysler Engine and 200' of 8" pipe, brand new
Wagner Saw Sharpener, m.d.

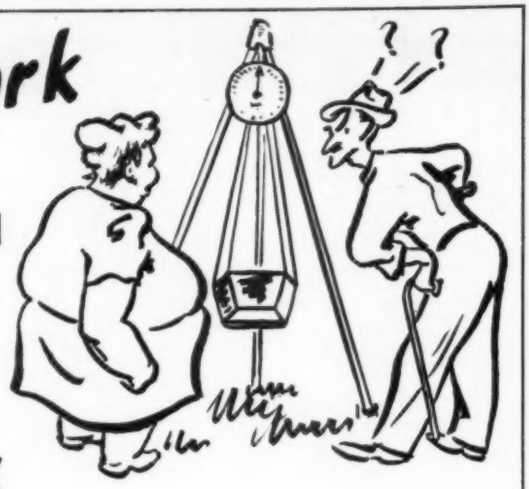
We carry an average stock of 2,000 machines in our 11 acre plant at Cincinnati. Visitors welcome at all times.



THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

Take the **Guesswork** out of **PRODUCTION PROBLEMS** with Time-Tested Machine Tools Rebuilt by

BOTWINIK



LATHES

Bridgeford 36"x56', 13-speed geared head engine lathe—MD, AC electrical equipment—power rapid trav. to carr.—compound rest—2 steady rests—swing 38" over bed, 28" over carr.—dist. between ctrs 48'—motorized apron and taper attachment.

PRATT & WHITNEY 20"x48" Ctrs Model "B" 16-speed engine lathe—motor in base—hole thru spindle 2"—Actual swing 21¼"—16 spdl speeds 8 to 383 RPM—Taper Atchmt

Pratt & Whitney 16"x36" Model "B" grd head motor-in-base engine lathe—swing over ways 16½". Ctrs 36", hole thru spdl 1-11/16" 8 spdl speeds 7-440 RPM

LODGE & SHIPLEY 20"x8' MD Grd Head Engine—12 Speeds—dist. bet. centers 43", swings 23"

TURRET LATHES

5—Bardons & Oliver #3 Univ. Turret Lathes (All late type)—swing 15⅜"—hole in spindle 1⅞"—max. dist. turret face to spdl end 24"—two with 3 HP Meters 67-1015 RPM—3 with 5 HP motors 100 to 1525 RPM

WARNER & SWASEY #4 & #5 Pre-Selector Head Universal Turret Lathes—holes thru spdls 2-7/16" and 2⅞"—swing 18⅛" and 20" Bar & Chucking

2—Gisholt #3L Saddle Type High Production Turret Lathes, hole thru spindles 5-1/16"—swing 28½" —Bar & Chucking (1942 mchns)

Foster #5 Univ. Ram Type Turret Lathes, latest type, AC motor driven, swing over bed 17½", hole thru spdl 2⅝", bar feed—extra tooling (Late Type)

HORIZONTAL BORING MILLS

Baush 4" Hydraulic Horizontal Boring, Drilling & Milling Mchs (late type) dia. Spdl 4", vert. travel spdl head 48", wkg surf tbl 48"x96" feed & power rapid traverse hydraulically driven

Yoder #3A Horizontal, (Late type—equiv. to new) 3" bar, max dist to outer support 72", bar travel 24"

HAMMERS (Board Drop)

2—Chambersburg 2500#
1—United 3000#
1—Chambersburg 4000#

Farquhar 100 Ton Hydraulic Press—Condition equal to new—daylight 48"—dist. between uprights 29"—stroke 36"—approach & return speed 1600 ft. per min. given max. variation 5 degrees—base dimensions 5'4"x6'—approx. net weight 44,000 lbs

GRINDERS

Blanchard #11 High Power Rotary Surface Grinder—(Very late type) 16" dia. magnetic chuck—range 20" dia. x 8" high

Norton 12"x36" "Multi-Purpose" Hydraulic Univ. Grinder with internal & external atchmts, chuck, face plate

Mattison 14"x24"x60" High Power Hydraulic Precision Horizontal Surface Grinder—complete with magnetic chuck

Pratt & Whitney Type M-1640, 14"x60" Vertical Hydraulic Surface Grinder, MD 30 HP on spindle, segment chuck wheel—complete with magnetic chuck (very late type—equal to new)

PRODUCTION MILLERS

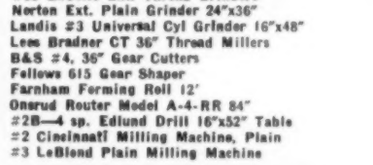
2—B&S #12 Plain Mill, Mchs, MD Tbl wkg surf 48⅝"x12"—feeds long. 18", cross adj of spdl 3¼", vert adj of spdl hed 10½" #50 Taper—electrically controlled, (very latest type)

Cin. #4—36 Plain Hydromatic Miller—Motor in base—(Late Type) Tb. wkg surf 63⅛"x16"—long feed 36"—automatic intermittent feed—power quick traverse.

Cin. #5—60 Duplex Tracer-Controlled Hyd Miller, Tbl Wkg surf 20"x78½", cross range left hand quill 8", right hand quill 8", vert. movement of spdl, tracer or manual control 13¼", (Very latest type)

Reed-Prentice #4 Improved Hydraulic Vertical Milling Machine—(Vintage 1942) complete with Detroit duplicating atchmt—Tbl wkg surface 24", vert. travel head 12"—top of tbl to spdl nose max. 24", min 12", power rapid traverse—#50 Taper—18 Spdl Spds 30 to 1200 RPM—Net weight of machine approx 18,000#

Chances are the machine you need is not listed here. Write, wire or phone—tell us your needs—our engineers will gladly help you solve your machine tool problems.



Botwinik Brothers of Mass., Inc.
3 SHERMAN ST. • WORCESTER 1, MASS.

Roller Type Scalping Machine 22" Slab Capacity
#1A W&S Turret Lathes Bar Feeds
Libby 26" Turret Lathe, 4½" Hollow Spindle
#33 ExCello Ext. Thread Grinders
Norton Ext. Plain Grinder 24"x36"
Landis #3 Universal Cyl Grinder 16"x48"
Lees Bradner CT 36" Thread Millers
B&S #4, 36" Gear Cutters
Fellows 615 Gear Shaper
Farnham Forming Roll 12'
Onsrud Router Model A-4-RR 84"
#2B—4 sp. Edlund Drill 16"x52" Table
#2 Cincinnati Milling Machine, Plain
#3 LeBlond Plain Milling Machine

CONTINENTAL SALVAGE & MACHINERY CORPORATION
1836 EUCLID AVENUE, CLEVELAND 15, OHIO
MAIN 4402

National Bent Shank Nut Tappers Battery of ⅝" to 1" Machines.
Waterbury-Farrel Fdry. ⅝" and 1" D.S. S.D. Cold Headers, also Thread Rollers.
Fisher 5" Bar, Floor Type Boring Mill. New in 1942.
Niles, Bement, Pond 60"x60"x24' table 4-Head Planer, Rev. D.C. M.D.
Bliss Presses in all sizes up to 1,000 ton capacity.
Wire Working Machinery.

National Machinery Exchange
128-138 Mott St., New York 13, N.Y.

AUTOMATICS

No. 0G Brown & Sharpe
8" Bullard Multaumatic
⅝" Acme Gridley R6
1⅝" New Britain No. 61
1⅞" Conomatic 8 spindle
14"x19" & 16"x33" Fay
Gisholt Simplimatic
1 1/16" Cleveland 4 spindle

BORING MACHINERY

2½", No. 25T Giddings & Lewis
3¼" bar No. 32 Lucas horizontal
4½" bar No. 33 Lucas horizontal
4" bar, No. 42 Lucas horizontal
3" bar Universal horizontal
100" Niles-Bement-Pond, heavy pattern
53" Niles Bement Pond

DRILLS

21" & 24" Cincinnati upright
Nos. 121, 217, 314 & 315 Baker heavy
6', 15" Cint. Bickford radial
24", 6 spindle Foote Burt sensitive
4' Hammond Elbow Arm Radials
B4A—24 spindle Natco
24", 4 spindle Allen & Demco
12", 4 spindle Avey No. ½
15", 3 spindle Avey Type MA6

GEAR MACHINERY

No. 50 Cross Tooth Thinner
8H, 12H & 16HS Gould & Eberhardt
No. 12 Barber Colman
No. 5M Adams Hobber
No. 4 Cimatool Rounders
No. 130 Cleveland Rigidhobber

GRINDERS, CYLINDRICAL

6"x18" Norton, Landis, & Brown & Sharpe
Nos. 1, 2, & 13 Brown & Sharpe Universal
10"x18", 10"x30", & 10"x50" Norton mechanical
10"x15" Landis Type C, Hyd.
10"x24" & 16"x72" Landis Mechanical
14"x36" Landis Type C, Hyd.
16"x36" Landis Type D, Semi-Auto. Hyd.

GRINDERS, SURFACE

16" No. 10 Blanchard Rotary
30" No. 16 Blanchard Rotary
12" & 16" No. 22 Heald Rotary
16" & 24" No. 25A Heald Rotary
8" Pratt & Whitney Rotary
10"x24" Norton Hydraulic
12"x48" Thompson Hydraulic
14"x60" Mattison Hydraulic
14"x40" Pratt & Whitney Vertical
9"x24" Abrasive No. 34 Vertical
24"x48" Springfield Planer Type

LATHES ENGINE

14"x6' Lodge & Shipley
14"x8' American
15"x6' Porter McLeod
16"x30" centers Monarch
36"x16' Bridgeford

LATHES TURRET

24" & 42" Bullard
Nos. 4, 1L & 3AL Gisholt
Nos. 3, 1A, & 3A Warner & Swasey
No. 3 Jones & Lamson
No. 2F Foster Fastermatic

MILLING MACHINES

Nos. 2H, 3H, & 4H Kearney & Trecker Vertical
Nos. 2, 3, & 4 Cincinnati Vertical
Nos. 1, 1M & 2 Kent Owens Hand
Nos. 1-12, 2-18, & 2-24 Cincinnati Automatic
Nos. 2-18 & 2-24 Cincinnati Rise & Fall Automatic
Nos. 3-24, 4-36, 5-48, 34-336, 56-72, & 56-90 Cincinnati Hydromatic
Nos. M-18, M-24 & 12-24 Kearney & Trecker

PRESSES

Nos. P1, P2, P3, P4 & P5 Ferracute punching
Nos. 10, 73½, 75½, 304 & 307 Bliss S.S.
No. 1½ Bliss cam drawing
1000 ton French Oil hydraulic
No. 2316½ Hamilton Coiner

MILES MACHINERY CO.
SAGINAW, MICH.

LATEST TYPE NEARLY NEW MACHINES

PRATT & WHITNEY
3B Jig Borer Motor Drive, Latest Type

MODEL 4854

BORING MILLS—Horizontal

CINCINNATI-GILBERT 3½" Bar, Floor Type, Latest
DETRICK & HARVEY 4" bar, Floor Type
GIDDINGS & LEWIS #25, 2½" Bar, M.D.
LANDIS #35, 3½" bar, Floor Type
NILES BEMENT POND 5", 6" bar, floor type, M.D.
UNIVERSAL 3" bar, latest type
UNIVERSAL Model 3A, 3" Bar, M.D.

BORING MILLS—Vertical

BETTS 120" 2 swivel heads, AC, M.D.
BULLARD 16" 6 spindle, 8 spindle, Mult-au-matic, Type D Single Indexing, Latest Type
BULLARD 36" Vert. Turret, Side Head, PRT, M.D.
KING 52", 62" 2 swivel heads, PRT, M.D.
NILES 38-44 Vert. Turret Side Head, PRT, M.D.
NILES 84" 2 swivel Heads, PRT, M.D.
NILES 100" 2 Swivel Heads, PRT, M.D.

BROACHES

CINCINNATI 1-30 Duplex Vert. Hyd., Latest
CINCINNATI 3-30 Duplex Vert. Hyd., Latest
OIL GEAR XL-32 Horiz. Hyd., Latest

GEAR CUTTING EQUIPMENT

BROWN & SHARPE No. 3H gear cutter, M.D.
FELLOWS Model Z Gear Shaper, High Speed, Latest
FELLOWS 61, 615A, 7, 7A, 72, 75, 77, 61A High Speed Gear Shapers, latest type
FELLOWS 12M Involute Measuring Instrument
FELLOWS Type 6Z2 Gear Shaper, High Speed, Latest
FELLOWS #13 LS Lapping, Latest Type
GLEASON #20 Spur Gear Tester, Latest Type
GLEASON 8", 12" Straight Bevel Generator, latest
GLEASON 11", 18" bevel generator, M.D.
GLEASON #17 Hypoid Zerol, Spiral Bevel Gear Grinder, Latest Type
GOULD & EBERHARDT 12HS Hobber, latest
PRATT & WHITNEY 10" Grinder, hyd., latest

GRINDERS—Cyl.—Plain & Univ.

BROWN & SHARPE #1, 2, 3 Universal, Latest
BROWN & SHARPE #5 Plain, 3x12, Latest Type
BROWN & SHARPE #20, 10x18 plain, latest type
CINCINNATI 6x18 plain Model EA, hyd., latest
LANDIS 4x12 Type H Plain Hyd. Latest
LANDIS 10x24 Type C Univ., Hydraulic, Latest
LANDIS 4"x18", Type H, Plain, Hyd., Latest
NORTON 6"x18", Type C, Plain, Hyd., Latest
NORTON 10"x36" Type C, Plain, Hyd., Latest

GRINDERS—Internal

BRYANT #5, #16-16 Hydraulic, Latest
BRYANT #16-CP-16, #24 Hyd., Latest
BRYANT No. 24, Hyd., Latest
HEALD #70A Plain, 72A3 Sizematic, Latest
HEALD #72A3 Plain, 72A5 Plain, Hydraulic, Latest
HEALD #72A5 Universal, 74 Hydraulic, Latest
HEALD #81 Sizematic, Hydraulic, Latest

GRINDERS—Surface

BLANCHARD #11—16 chuck, Latest Type
BLANCHARD #16—24" chuck, Motor Drive
BLANCHARD No. 16A—Dial Type—M.D.
DoALL 8"x24" Hydraulic, Latest Type
HEALD #22, 12" chuck, Rotary, latest type
HEALD 25A, 16" or 30" Chuck, Rotary, Hyd., Latest
MATTISON 14x24x72 Hydraulic, Latest Type
MATTISON 14x14x60 Hydraulic, latest type
NORTON 6"x18"—Hyd.—Latest Type
THOMPSON 16x30x48 Hyd., Latest Type

JIG BORERS

VERNON "Precision" M.D., Latest Type
PRATT & WHITNEY 1A Motor Drive
REED PRENTICE #5 Vertical Die Sinker Latest

LATHES Engine and Mfg.

AMERICAN 18x72" centers, Geared, M.D.
AMERICAN 36x360" centers 2 Car., M.D.
BRIDGEFORD 36"x32' bed—2 car., M.D.
JONES & LAMSON "Fay" 20x25" automatic TIMKEN, Latest Type
LeBLOND 25x96" centers, Geared, M.D.
LEHMAN 16x30 hydratrol, Timken, latest type
LODGE & SHIPLEY 18"x72" centers, M.D.
LOSWING 4x60, 4x84, 8x60, 8x108, 5x34" centers, latest
MONARCH 12x54" centers Timken, Latest Type
MONARCH 22x456" centers, 3 Car., Timken, Latest
MONARCH 10x20" centers, Model EE Timken, latest
MONARCH 16x28" centers, geared hed., M.D.
MONARCH 12x30" centers, Timken, Latest Type
NILES 42"x60", double head, M.D.
NILES 48x87' centers, Comb. Boring & Turning, M.D.
NILES 60x10' centers, Timken PRT, Latest Type
NILES 72"x62', centers, comb. Boring and Turning, M.D.
NILES 30x50' Boring, Timken, Latest Type
PUTNAM 42"x25' centers, Geared, M.D.
SEBASTIAN 16"x36" Centers, Type H, Timken, Latest
REED PRENTICE 16x24" centers, geared hd., M.D.
SPRINGFIELD 16"x30" centers, Timken, Latest Type
SPRINGFIELD 16"x43" centers, geared hd., M.D.
SPRINGFIELD 16x24" centers, geared hd., M.D.
WARD HAGGAS & SMITH 18/36"x10' bed, Gap

LATHES—Turret

BARDONS & OLIVER #5, #7 Timken, latest
CINCINNATI ACME No. 1, Latest Type
FOSTER 4FU, Fastermatic, Timken, Latest
GISHOLT #3, 4, 5 Univ., Timken, Latest
GISHOLT #1L, #2L, Universal, Timken, Latest Type
JONES & LAMSON #3, #5, #8A Univ., Latest
LIBBY 1H-5, 5¼ hole, Timken, Latest
MOREY No. 2G, No. 3, No. 4 Timken, latest
POTTER & JOHNSTON 5D, Timken, Latest
POTTER & JOHNSTON #5D2E, TIMKEN, latest
WARNER & SWASEY #5, Univ. Timken Bearing
WARNER & SWASEY #1A, Univ., Latest Type
WARNER & SWASEY 2A Univ. Bar and Chuck Latest Type

MILLING MACHINES—Mfg.

CINCINNATI 24" duplex, TIMKEN, M.D.
INGERSOLL 42x38x12' Planer type, Adjustable rail, 4 heads, AC, M.D.
INGERSOLL 32x30x12' Planer Type Slab, AC, M.D.
INGERSOLL 32x24x16' Planer Type 2 heads, AC, M.D.
SUNDSTRAND Model 3A Duplex, Latest Type
TAYLOR & FENN M-80 Duplex, Spline, latest type

MILLING MACHINES—Plain

BROWN & SHARPE No. 2 Light Type, Timken, Latest
BROWN & SHARPE 3B, Timken, Latest
BROWN & SHARPE #12 Timken Bearing, latest
CINCINNATI #4 Timken Bearing, M.D.
CINCINNATI #3, 4, 5, Motor Drive
CINCINNATI 4-36 Hydromatic, latest type
CINCINNATI 0-8 Auto. rise and fall, Timken, Latest
CINCINNATI 56-90 Hyd., Timken Latest
KEARNEY & TRECKER 2H Timken, Latest
KEARNEY & TRECKER #3, 4 heavy, Timken, latest
KEARNEY & TRECKER 1218, simplex, latest
KEMPSMITH #4 Maxi-Mill, Timken, latest

MILLING MACHINES—Vertical

CINCINNATI #2, 3, 4, Dial Type, Timken, latest type
GORTON 9J Super Speed, Latest Type
KEARNEY & TRECKER 2H, Timken, Latest
REED PRENTICE 3VG with or without Hydraulic Duplicator, Timken Bearing, latest type

PLANERS

CHANDLER 36x36x20', 4 heads, AC, M.D.
CLEVELAND 48x28x6' Openside 3 heads, M.D.
DETRICK & HARVEY 48x48x16', 4 heads, Hyd.
GRAY 36x36x8', 2 heads, maximum duty, DC, M.D.
NILES BEMENT POND 48x48x16', 4 heads, AC, M.D.
NILES 48x48x12' 3 Heads, DC, M.D.
NILES 54x54x18' 4 Heads, Box Table, DC, M.D.

PRESSES

BIRDSBORO 325 ton, vert., hyd., Latest Type
CHAMBERSBURG 50 ton vert. hydro-pneumatic
CHAMBERSBURG 200 ton, horiz., straightening, M.D.
CLEARING Type DS-1125-32 dbl., action 125 ton, Latest Type
CLEARING Type H-50-36-35-ton Vert. Hyd., Latest
FERRACUTE #DG-55, 75 ton drawing, Latest Type
GLEASON 15 ton Quenching, M.D.
HPM 37-ton Vertical Hydraulic, Latest
WATSON & STILLMAN 20 ton hyd., sgt., Latest

SCREW MACHINES—Automatic

BROWN & SHARPE #2—1" and 1¼" Cap., High Speed, Latest Type
BROWN & SHARPE #4, 1½" capacity, latest type
GOSS & DeLEEUW 8", 5 spindle Chucker, Latest

MISCELLANEOUS

AJAX 1⅛", 3½", Bolt Heading, Upsetting and Forging
BARNES #172, 306H, 307 Vertical Hone, Latest Type
CLEVELAND 12"x16" Cutter Reliever, Motor Drive
FOSTER 4"x18" Super Finisher, Latest
JONES & LAMSON 6x15", 8x48" thread grinder, latest
LEES BRADNER HT, 12"x24" Thread Miller, Latest
MICHIGAN Model 1708 Cutter Reliever, Latest
PRATT & WHITNEY "Keller" Type G, Type BL2416 —Latest Type
PRATT & WHITNEY ½Bx30, ½Bx50 2 spindle Deep Hole Drill, Latest
PRATT & WHITNEY ½Bx50 2 spindle Rifler, Latest
RACINE 30C, 10"x10" Hack Saw, Hyd., Latest
SMITH & MILLS 16" High Speed Shaper, Latest

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Late Type—EVERY MACHINE TESTED AND GUARANTEED AS REPRESENTED—*Immediate Delivery*

LATHES

SOUTH BEND, 14"x6', 16"x10', 10"x3½'
BRADFORD, 14"x6', 16"x8', 16"x8'
CLAUSING, 12"x5' M.D.
RENDEY, 16"x6', 16"x8', taper attach.
RIVETT, No. 608 taper attach. precision
BRIDGEFORD, 26"x34"x17', taper attach.
LE BLOND 'REGAL', 13"x5', 17"x6', 17x9'
HARDINGE, 1" cap. second operation
ELGIN & HARDINGE PRECISION, 1" cap.
PRATT & WHITNEY, 10"x20", precision
PRATT & WHITNEY, 13"x6', taper attach.
SIDNEY, 18"x10', taper attach.
Monarch Toolroom Model "EE" 10"x20"
Monarch Toolroom 16"x30" Model "C"
Monarch Toolroom 18"x54" Model "C"
Greaves-Klusman 38"x72" Centers, G.H.

TURRET LATHES

WARNER & SWASEY #5 Universal, Preselector
MOREY #3 Universal, Bar & chucking (1945)
GISHOLT, #3 bar equip, preselector, #5, #1L
WARNER & SWASEY, #1A chucking
FOSTER, #5 universal, bar feed
SIMMONS MICRO-SPEED, 1¼" cap, bar feed
WARNER & SWASEY #1, ⅝" cap.
BROWN & SHARPE, #0 and #1 Hand Screw
Jones & Lamson No. 5, No. 9A, preselector

GRINDERS

BROWN & SHARPE #2 Universal, #13 T.C.
NORTON #2 Universal Hydraulic Tool & Cutter
COVEL, #91A, tool & cutter universal
CINCINNATI, #2 centerless, Filmatic
LANDIS, cylindrical, type H, 4"x12"
HEALD, #72A3, plain internal, HYD.
BLANCHARD, VERTICAL SURFACE, #16, 26"
BLANCHARD, VERTICAL SURFACE, #11, 16"
ABRASIVE, VERTICAL SURFACE, #33, 8x24"
MATTISON, SURFACE, 14"x16"x60", hyd.
BROWN & SHARPE, #5 surface, hyd.
REID, SURFACE, #B, 2B Pope spindle
RIVETT #104—Int.—Ext. Latest
BROWN & SHARPE #2 & #2B Surface
Excello Thread Grinder #31
Jones & Lamson Thread Grinder, 12"x45"
Do-All Hyd. Surface Grinder 6"x18"
Cincinnati Universal Grinder 12"x36"
Wicaco Precision Internal

SHAPERS

Cincinnati 24" latest heavy duty
Gould & Eberhardt, 16", 20" Industrial
Stockbridge, 16", M.D.
Pratt & Whitney, Vertical 6", M.D.
Atlas on steel bench 7", M.D.
Shaperite floor model 8" NEW

DRILL PRESSES

American 3' Sensitive Radial
American Radial, 4'x11" column
Avey, 2sp. #MA6, #3 taper
Avey, #2 single spindle, 15" overhang
Leland-Gifford, #3, single spindle
Allen, 6 spindle, #2, 12" overhang
Champion 24", backgeared, #4 taper
Natco, multi-spindle, #D5
Canady-Otto drills 4sp. NEW
Canady-Otto, 17" Roller bearing
Cleerman Box Column

PLAIN MILLERS UNIVERSAL

AMES, UNIVERSAL, PRECISION, BENCH
BROWN & SHARPE, #3A, UNIVERSAL
BROWN & SHARPE, #3B, PLAIN
BROWN & SHARPE, #3, UNIVERSAL
CINCINNATI, #2MH, Universal
KEARNEY & TRECKER, #1B, S.P.
BROWN & SHARPE #2 Light Type, Vertical Head
Milwaukee Universal No. 2HL
Milwaukee Plain No. 2H

VERTICAL MILLERS

CINCINNATI, #3, #4, dial type
VAN NORMAN, #3V, rapid traverse
KEARNEY & TRECKER, #2KM, dial type
KEARNEY & TRECKER, #3KM, dial type
KEARNEY & TRECKER, #3H, dial type
BRIDGEPORT Turret Miller
CLEERMAN Jig Borer 18x30

PRODUCTION MILLERS

WALTHAM thread miller, ext. & int.
CINCINNATI, #1-12 automatic
KEARNEY & TRECKER, #1H-18 Mfg. type
SUNSTRAND, #2 Electromill, 24" travel
BROWN & SHARPE, #000, high speed

GEAR MACHINERY

BARBER-COLMAN MODEL, #3
FELLOWS #61A, Model—712
GLEASON, 18" cap. straight bevel
GOULD & EBERHARDT, #735, spur gears

AUTOMATIC SCREW MACHINES

BROWN & SHARPE, #0G, ⅝" cap.
BROWN & SHARPE, #2, high speed
BROWN & SHARPE, #2, with slotter
BROWN & SHARPE, #00, high speed ⅜" cap.
New Britain, #61, 2¼" cap.

BOREMATICS AND BORING MILLS

Defiance #25A Horizontal 3¾" Bar
Bullard, Spiral Drive Vertical Turret 42"
Excello #2112A, double head
Heald #48A, single head
Heald Bore-matic No. 49, 4 heads
Lucas No. 41, 3" cap. extra long table

PRESSES, SHEARS, BRAKES

Niagara 6'x10 gage, 16" gap
Verson 6'x45 ton cap. press brake
Famco Shears, 36", 52" NEW
Ferracute Press #C3, inclinable
Double Crank Press, 40 ton cap.
Zeh & Hahnemann, 10 ton roll feed
Erie hydraulic 750 ton like new
Diebel Hi-speed and roll feed
Hydraulic Press 25 ton to 750 ton

MISCELLANEOUS

Riveting Hammers, high speed, #5A
Spot Welders 5 KVA to 100 KVA
Famco Foot Presses, #6, #8, #10, #12, #15
BUTTERFLY Filing machines
Porter Cable belt sanders
Lake Erie Hydraulic Press 750 Ton

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UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 16"x36", Surface 13"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10—16"x6', 8', 10'—18"6', 8', 10'—26"16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized
Large stock 19" and 18" bench and floor type.

Planers—Single head 24"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—3"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 30", 40".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 3¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 3" capacity in steel, motor attached.

PATTERN MAKING MACHINERY—12"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

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3/16"	square x 2"	long $.05 each
¼"	square x 2½"	long .10 each
5/16"	square x 2½"	long .15 each
⅜"	square x 3"	long .20 each
7/16"	square x 3½"	long .35 each
½"	square x 4"	long .50 each
⅝"	square x 4½"	long .75 each
¾"	square x 5"	long 1.00 each
⅞"	square x 6"	long 1.25 each
1"	square x 7"	long 1.50 each

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Ƨ2 Brown & Sharpe light type Vertical Miller, table 8"x45", spindle speeds 55 to 1800 rpm, late model, serial Ƨ1747.
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Ƨ0-G Brown & Sharpe Automatic Screw Machine, high speed, serial Ƨ7695, motor in base.
PRICE $1900.00

Ƨ2-B Brown & Sharpe Plain Miller, double overarm, vertical attachment, Ƨ50 taper spindle.
PRICE $2900.00

Ƨ2 Brown & Sharpe Standard Vertical Miller, motor in base, excellent.
PRICE $3500.00

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MODERN
used and rebuilt
MACHINE TOOLS

AUTOMATICS
9/16″ and 1″ RA-6 Acme-Gridley. New 1943.
1¾″ 6 Spindle Greenlee. New 1942.
★2½″ Cleveland Screw Machine. New 1944.
6″ 4 Spindle Conomatic. New 1942.
6″ Goss and DeLeeuw Chucking Machine—eight spindle. New 1943.
★Bullard Multaumatic, six spindle model D, single index. Late Model.

BORING MILLS
★Universal No. 40 Tri-Way, 4″ bar, with facing head rotary table, boring bar, motor and control.
Heald No. 49 "Bore-Matic," three spindles each end. New 1942.
Heald No. 47A "Bore-Matic."
Excello Model 2112A, single end. New 1943.

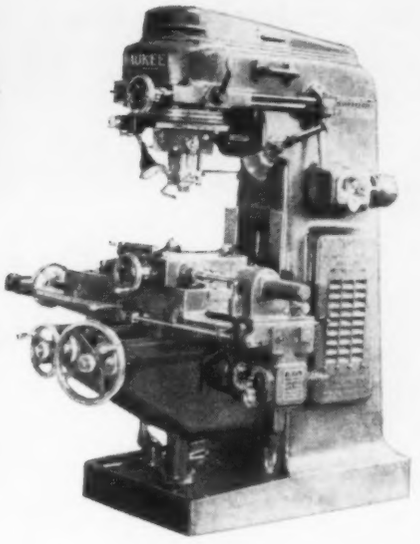
BROACHES
No. CPC 6-30 LaPointe Hydraulic Vertical. New 1941.
LaPointe Universal Broach Grinder.

DRILLS
6′ Carlton Radial, 17″ column.
4′ 11″ Carlton Radial. New 1942.
3′ Cincinnati Bickford Radial, 9″ column. New 1943.
3′ Dreses Radial, 11″ column enclosed head, motor on arm, 1938 model.
20″ Pfeffner Jack Knife Radial.
24″ Sibley Sliding Head.
25″ Fosdick Economax. Late model.
No. H3 Barnes Hydram, 8 speed. New 1942.
36 HO Baker. New 1942.
KH 2 Allen, 6 spindle. New 1943.
No. 2B-8 Edlund Single Spindle. New 1942.
★No. 2 MS Allen, one to three spindle, four speed motor on each spindle, 15″ overhang, extra large tables.
Demco 3 spindle Drill.
Hamilton-Muehlmat Drill.
Fox Multiple Spindle. New, 1942.
No. 3 Bausch Multiple Spindle.
Barnes Horizontal Deep Hole, two spindle.

GEAR CUTTERS
★No. 5 AC Lees Bradner Gear Generator. New 1941.
No. 5A & 715A Fellows Gear Shaper.
No. 615A Fellows Gear Shaper.
Red Ring Gear Shaper, Model G.C.L.
No. 12 Barber Colman Hobber
Model S Barber Colman Hobber.
Barber Colman Hob and Cutter Grinder.

GRINDERS
No. TG 615 Jones & Lamson Thread. New 1943.
No. 2 Cincinnati Centerless, Filmatic. New 1942.
★No. 2 Cincinnati Universal Tool & Cutter complete. New 1942.
No. 44, 48, & 49 Excello Carbide Tool. New 1942.
No. 4T Sellers Tool.
No. 22 Covel Universal Tool & Cutter. New 1943.
No. 13 Brown & Sharpe Universal and Tool.
No. 3 Brown & Sharpe Universal.
10″ x 24″ Landis Universal. New 1942.
14″ x 36″ Norton Universal.
6″ x 18″ Cincinnati, Filmatic Bearing.
6″ x 18″ Norton Type "C." New 1942.
6″ x 18″ Landis Type "C" Plain Hydraulic.
10″ x 48″ Norton Type "C."
10″ x 24″ Landis Type "C" Universal. New 1942.

MODEL 2D MILWAUKEE ROTARY HEAD MILLING MACHINE, with power feed to table and spindle, power operated rotary table, universal milling attachment, dividing head, swivel base vise, motor and control. New 1945.



No. 22 Heald Rotary Surface. New 1943.
10″ x 36″ Landis Type "C" Plain Hydraulic. New 1942.
No. 25A Heald Rotary Surface. New 1942.
16″ x 16″ x 48″ Thompson Model C.
3B Abrasive, with chuck. New 1943.
No. 15 Gallmeyer Livingstone Surface.
6″ x 12″ x 18″ Thompson Surface. New 1942.
No. 2B Reid Surface, for wet grinding.
No. 16CP16 Bryant Hydraulic Internal. New 1942.
No. 104 Rivett Internal.
No. 75A Heald Internal. New 1943.
No. 72A3 and 72A5 Heald Internal. New 1943.
No. 74 Heald Extended Bridge Type Internal.

LATHES, ENGINE
Hendey 14″ x 6′, g.h.
Reed Prentice, 14″ x 30″, g.h.
Reed Prentice, 14″ x 78″, Toolroom. New 1943.
Reed Prentice, 14″ x 54″. New 1943.
Bradford 18″ x 48″, g.h. New 1942.
Sidney 18″ x 54″. New 1943.
Lodge & Shipley 18″ x 54″, g.h. New 1943.
Lodge & Shipley 20″ x 48″. New 1943.
28″ x 34′ "Timesaver," g.h. New 1942.
Carroll Jamieson, 18″ x 5′, C.D.
South Bend, 14½″ x 6′ New 1944.
Lo-Swing 8″ x 36″. New 1942.
Lo-Swing, models IMP and R.
8″ x 15″ and 8″ x 21″ Sundstrand Automatic. New 1943.
12″ x 21″ Fay Automatic. New 1943.
14″ x 42″ Monarch "Magnomatic." New 1942.

LATHES, TURRET
Warner & Swasey No. 4A, with chuck, 7½″ hole.
★Warner & Swasey No. 3A. New 1943.
Warner & Swasey No. 2A. New 1943.
Jones & Lamson No. 9A. New 1943.
Gisholt No. 3L. Late Model.
Gisholt No. 3. New 1943.
Acme No. 1 Universal, saddle type. New 1941.
Bardons & Oliver No. 7 Ram Type, Bar Feed and Tooling. New 1942.
Gisholt No. 4 Universal, Hydraulic speed selector.
Warner & Swasey No. 5 Universal. New 1941.
Warner & Swasey No. 4 Universal. New 1941.
Warner & Swasey No. 3 Universal. New 1942.
Bardons & Oliver No. 3 Universal, motor in base. New 1941.
Warner & Swasey No. 2. New 1942.
Bardons & Oliver No. 2, bar feed. New 1941.

MILLS
Milwaukee No. 2H Universal. New 1942.
Cincinnati No. 2M Universal.
★Cincinnati No. 2MH Universal. New 1942.
Brown & Sharpe No. 2A Universal. Late type.
Kempsmith Maximiller Plain, No. 3.
Brown & Sharpe No. 3B Plain. New 1943.
Brown & Sharpe No. 2B Plain.
Cincinnati No 2M Plain.
Milwaukee No. 3H Vertical, latest model.
Cincinnati No. 2 Vertical. New 1940.
Index No. 40H Vertical.
Cincinnati Plain No. 08 and 2-18, Rise and Fall.
Cincinnati No. 1-12 and 1-18 Automatic.
Cincinnati No. 3-36 Hydromatic.
Cincinnati No. 34-36 Hydromatic High column with Hydrotel.
Milwaukee M-24. New 1942.
Milwaukee No. 1248 Simplex.
DeVlieg Supermill, No. 31B.
Brown & Sharpe No. 12. New 1942.
Kent Owens No. 1-14.
Sundstrand No. 00 & 2 Rigidmill.
Whitney Hand Mill, No. 6.
VanNorman Hand Miller. New 1942.

MISCELLANEOUS
Savage Nibbler, 8″ throat, 3/16″ capacity.
Cleveland Rigidturner, No. 616.
14″ x 20″ Racine Hydraulic Saw.
13″ x 13″ Peerless High Speed Saw.
11″ x 11″ Peerless Hydra Cut.
No. 26F Norton Hydrolap.
No. 8-6 Zeh & Hanneman S.S. Geared Press.
Reliance 45 Ton Press. New 1942.
Williams White No. 14½ Punch, 1″ through 1″.
Tapper, Leland Gifford 3′ Radial, No. 3 M.T. New 1941.
Parker Tube Bender, No. 824G.
Schauer, Colbourne & Vera Speed Lathes.
5 H.P. L'Hommedieu Buffer.
5 H.P. Clark Buffer.
18″ Gardner Disc Grinder.
Langelier Type "D" Swager. New 1941.
Hendley & Whittemore Type 3C Punch & Shear.

PLANERS & SHAPERS
Ohio Planer, 36″ x 36″ x 16′ M.D.
Cincinnati Planer, 42″ x 42″ x 20′, Four heads D.C.
Cincinnati Planer, 52″ x 36″ x 40′, Four heads. Box table D.C. motor drive.
Gould & Eberhardt 16″ Shaper.
Smith & Mills 28″ Shaper.
Pratt & Whitney 6″ Vertical Shaper. New.

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DRILLS

Avey & Allen 3, 4, 5, & 6 Spindles
Fox M.D. Type 138C Multi Spld. Late
Cincinnati-Bickford 3', 4', 5', & 6' Radials
Niles-Bement & Pond 6' Radial
P&W 16 Spld. Rect. Head

GRINDERS

Norton 6"x10"x36" Surface
Norton 15"x17"x72" Surface
Hill-Acme 18"x96"x24" Surface
B. & S. Nos. 1, 2, 3, 4 Universal
B. & S. Nos. 5 & 11 Plain
Bryant Nos. 3B, 6 & 12 Internal
Norton No. 2 Cutter & Tool, M.D.
Cincinnati No. 2 & No. 3 Centerless
Cincinnati No. 3 Centerless Lapper
B. & S. No. 13 Univ. & Tool, Late Type
Blanchard No. 16—26" & 16A
Blanchard No. 16—30 Vert. Late
Heald No. 25-A 16" Rotary Surface
Heald No. 22—12" Rotary Surface
Abrasive Nos. 33, 3 & 34 Surface
Heald Nos. 70A & 72A Internal
P. & W. 14" Vert. B. B., M.D.
Norton Type "C" 6"x18" M.D. Hyd. Cyl.
Norton 10"x24" M.D. Plain Cyl.
Pratt & Whitney 9" M.D. Hyd. Gear

LATHES

Johnson 36"x36' B.G.L.C.G. Engine
Monarch 12"x30" CK (swings 18")
Hendey Plain 12", 14", 16", 18" Yoke Head
Hendey 12"x5' Y. H. Fact. M.D.
Hendey 24"x8' M.D. Q.C.G. Eng.
Hendey 12"x5' M.D. Geared Head
Amer. 18"x12' B.G. M.D. Engine
American 30"x16' G.H. M.D. Q.C.G. Eng.

MILLERS

Milw. No. 1½B Univ. M.D.
Cin. No. 2 Univ.
K. & T. No. 2HL, No. 4H Plain
Milw. No. 3B Univ. D.O.
B. & S. No. OY Production
B. & S. No. 3A Universal
Cin. Nos. 2 & 3 Vert.
Van Norman No. 3SP Plain
Becker Model C Vertical
B. & S. Nos. 3B Plain
Van Norman Nos. 0, 10 & 11 Duplex
P. & W. 8", 10" & 12" Auto.
Cincinnati 18" & 24" Production
P. & W. 6"x80" M.D. Thread
P. & W. 6"x14" Int. Thread
Cinn. No. 3 M.D. Plain
Milw. No. 1H-12 Mfg.
Potter & Johnston 2M Horiz. Auto.
Gorton No. 9J Vert. Late
B. & S. No. 21 Plain Auto.
Kempsmith No. 2G Plain Late
Kempsmith No. 4, Plain Max. Late
LeBlond 3GH Plain Heavy

SHAPERS

Cincinnati 24" M.D. Crank Late
Hendey 32" M.D. Crank Late
Gould & Eberhardt 24" Crank
Gould & Eberhardt 16" M.D. Crank

PRESSES

Bliss No. 304 M.D. S.S. Single Crank
Bliss No. 21 O.B.I. Power
W. F. No. 7 O.B. Dial Feed
Bliss No. 703 M.D. Flat Edge Trimmer

SCREW MACHINES

B. & S. No. 00, 0, 2 Automatic
B. & S. Nos. 1 & 2 Hand
Gridley ⅞", 1¼", 1¾" & 2⅝" Model G
Cone 1¼", 3¼", 3½" & 4¾"—4 Spindle
Simmons No. 2 Micro-Speed
Foster No. 7 & 7B
W. & S. Nos. 1, 2, 2A, 3A Univ.
Gisholt No. 3L Bar & Chucker
New Britain Gridley Model 60 and 41

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INCORPORATED

BENNETT SPECIALS

36' Bullard Mill Spiral Dr., 3 Jaw, 1942
6" bar Ingersoll Floor Type Mill 6' vert. & 6' hor., new 1943
5" bar Sellers Table Type Mill, 48" spin. to table, 100" spin. to outer support, '42.
4" bar Universal Table Type Mill, 60" spin. to table, 96" spin. to outer support, '42.
3½" & 4" Landis Floor Type Mills
10"x48" Cinci. Grinder Plain, Late
48" x 19'6" centers Niles Heavy Lathe, Taper, new 1943
42"x84" centers Amer. Lathe, M.D.
36"x32' bed Niles Lathe, 2 carr., T.A.
20"x92" centers Hendey Lathe, T.A., collets
16"/18½"x54" cc Springfield Lathe, 1944
7' Carlton 17" col. Radial, 1943
Nos. 5, 4, 3 & 2 W. & S. Turrets, Late
#4 Gisholt Univ. Turret Lathe, 1942
48"x48"x24' Gray Planer, 4 Hds., Non-Metallic ways, '42. Var. Voltage
36"x36"x12' Cinci. Hypro Planer, 4 Hds., Var. Voltage, 1943
24"x24"x16' Ingersoll Planer Type Miller, 4 hds., 20 H.P. AC, M.D.
48" N.B.P. Slotter, Grd., Late
15'x¾" Wicks, Bending Rolls, M.D.
3" Bar Yoder Table Type, Hor. Mill

BENNETT MACHINERY CO.
30 Church St., New York 7, N. Y.

PRESSES

375 ton Elmes, 12" stroke, 84x54 bed, late type
350 ton Elmes, 20" stroke, 38x45 bed, late type
260 & 750 Baldwin, 144x48 bed, 40" stroke
#408A Bliss Dbl. Action Toggle, 72x54 Bed, w/cushions, mtrs., controls.
#305 Bliss, 8" stroke, late, w/air cushions.
60 ton, Dbl. Crank, 5" stroke, 48x24 bed, late model Waterbury Farrel (3).
200 ton 12" stroke, 27x27 bed, Bliss 43'.
#56 Toledo 4" stroke, 21x21 bed, 18½" shut height.
35 ton, 4, 5, 6" stroke, latest type, pract. new, w/all accessories, Bliss $850.00 ea.
70-85 ton 4" stroke, 21x27 bed, 110 strokes per min., Bliss, latest type.
90-125 ton 4½" or 5" stroke, 80, 90, 110 (optional) strokes per min., late Type.
Inclinable, new, 20 to 70 ton, Immed. dely.

AUTOMATICS, LATEST TYPE

#0G B & S, late type
1" New Brit. Grd., 6 spdl.
1⅜" R4—New Brit. Grid.
1½" & 1⅝" Cone—8 spdl. late
9/16", 1", 1¼", 1⅜", 2", RA6 Acme Grid.
2¼" & 2⅝" Cone 6 Spdl.
16" 8 spdl. Bullard Multaumatics, pract. new, (3) with some tooling, dbl. & sgl. index.
12" 8 spdl. Bullards, late type, lots of tooling.

PAUL'S MACHINERY COMPANY
MONA MEMBER
6111 Vermont Avenue
Detroit 8, Michigan
TYLER 7-6300

EXCEPTIONAL BUYS—CLEAN TOOLS

No. 4 W-S Turret, Bar feed, quantity of tooling 412,000 plus
6 spindle drill press (Demco) Late
P. W. Keller Machine Like New
Haskins and Bakewell Tappers Late
Lees Bradner Thread Miller (Cheap)
2-TR-59 Hardinge Lathes Late
Vernon Jig Borer Late
Model EE 10" Monarch Complete, Like New
#4 Cinn., Horizontal Mill Cheap
#5 B-O Universal Turret Lathe Chucking (15373)

New Machinery in Stock

FERDINAND J. SNOW CO.
381 Broadway Westwood, N. J.
WEst. 5-1027

MACHINERY FOR SALE

- 1—22'x48" Monarch heavy duty lathe good as new
- 1—Lodge & Shipley duomatic lathe
- 1—Gould & Eberhardt 36B rougher
- 1—D.E. Whiton #16 gear cutter
- Potter & Johnston #5 DE machines

SIER-BATH GEAR & PUMP CO., Inc.
9252 Hudson Boulevard
North Bergen, New Jersey

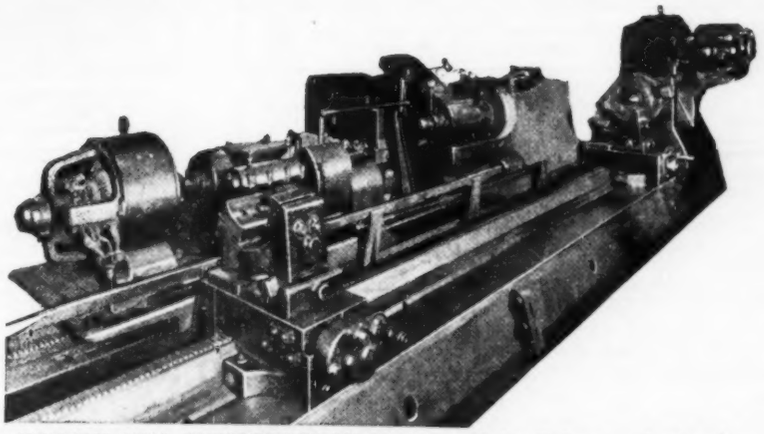
Cincinnati #3 Centerless grinders, 1944
Landis 6x30 plain hydraulic cylindrical grinder, 1940
B & S #3A universal milling machine, fully equipped, 1943
K & T #1H vertical milling machine, 1943
Cincinnati 48" automatic duplex miller, md
Hanson-Whitney 8x16 universal thread miller, 1940
Ferracute 200 ton 55 press, 3¼ stroke
Defiance #25A horizontal boring mill, 3¼" bar, 1940
Liberty 48"x48"x18' four head planer, 1942
Sidney 18"x11' geared head lathe, swings 21½", taper attachment, 2 chucks, 1941
Heald #49 borematic, double end, 4 heads, 1944

JOHNSON MACHINERY CO.
59 Edison Place Newark 2, N. J.

AARON
VALUES IN MODERN TOOLS

SCARCE LATE TYPES

Acme-Gridley 2⅝", 6 spindle, 1944
B & S 00G Automatics (3)
Van Norman #12, Slotter, #36
Canedy-Otto 3'9" col. Radial
NBP 2500 lb. Single Frame Steam Hammer
Ferracute D.D.G. 56, 100 ton Double Action Cam Press
Universal 3" boring mill
Gorton Duplicators and Vert. Millers, 8D, 9J
Gorton 3U, 3L, 3Z, ME, Engravers
Marvel No. 6 Hacksaw, M.D.
Landis #6 Thread Grinder
Hanson-Whitney Thread Miller
Thompson 6 x 18" Hyd. Surf. Grinder, Type C & F, Atlantic
Abrasive 8 x 18, 8 x 24 Surface Grinders No. 3B, 34, 1½
Conomatic 1⅞" 8 spindle
Brown & Sharpe #5 Cyl. Grinder
Tannewitz Band Saw #36M
Thompson Selsky Seam, Spot Welder
Mod. 26 Rafter, New 1945
W & S Nos. 3, 4 Grd. Hd. Preselector
Gisholt No. 4, 5, Univ. Turrets
Acme #6W M.D., Foster 3B
Oliver 20' Woodworking Planer
Oster 60I Rapiduction, Tooling
Hardinge E5M, 2nd operation
Cincinnati 12x36" Univ. Grinder
No. 18, 25 and 35 Gallmeyer and Livingston Hyd. Surface Grinders, 6x18, 8x24
#25A Heald, M.D., Rotary Surf.
Cinn. #2 Centerless Grinders Filmatic
B & S No. 2, 2B Surface, M.D.
Norton 6x18" Hyd. Surface, M.D.
Covel #91A Tool, & Cutter
Hammond & Excello Carbide Grind
Gardner #226 Disc Grinder
Monarch 10"x20" Lathe, Mod. EE
Hendey 12x30, G. H. Lathes
Morey No. 3 Univ. Turret Lathe
South Bend, M.D. 9x3½", 10x48" 13"x5'
Sebastian 12x4' grd. hd., Sheldon
Rivett No. 918 bench, M.D.
Hardinge, Elgin Cabinet Lathe
Lodge & Shipley 16"x78" 12 speed
Buffalo #0 Angle Roll, Excelsior
Bliss #58, OB Gap Presses 62, 62A, 162
Burke Miller Pl. & Univ.
Nichols Hand Miller, Vert. Hd.
Delta Single & Multiple Drills
Oliver Heavy die Filer, 510 Drill Pointer, Sellers 4G
Taylor Winfield 50 KVA Spot Welder
Peerless No. 226, Eyeletting
HI Speed Hammers, all sizes
Cinn. #3 Pl., #4 Vert. Dial Type Rect. Arm, Mills
B. & S. #12 Elec. Prod. #000
Waterbury-Farrell #30 Thread Roller & Dies, 1943
Cinn. Bickford 24" Super Serv.
V & O 102 Reducing Press
V & O, Z & H 25, 35 Ton OBI
Cinn. 1-12, 2-18 Production Mills
Stokes Tablet Presses
Ball & Jewel Plastic Grinders
20"x30' Boye & Emmes Grd. Hd., Lathe
Onsrud Router W248
Micromatic Hydrohoner HI
Walker-Turner Bench Drills, ½"
Porter-Cable 6B Belt Sander
LeBlond 19"x12 cc. Lathe, Removable Gap
Wilder Optical Comparator
Black Diamond Drill Grinder
Cinn. & Schauer Speed Lathes
Cleveland #1 Vertical Miller
Clark Hardness Tester
Bakewell #1, Ultromat Tappers
Federal #5 OBI Press
Gen. Flexible Elec. Screw Press
Davis #4 Keyseater
Chicago (D.&K.) 334 Brake
Clearing 90 10 Press Brake
Excelsior 21", Buffalo 18" Drills
Kent Owens IV Prod. Mills
Pratt & Whitney Radius Grinders
DoAll ML Band Saw



NORTON ROLL GRINDER 50"x28' Centers. Motor Driven, actual swing 54". Bed divisible into two sections. *IMMEDIATE DELIVERY.*

NEW IN STOCK

Power Foot & Gap Shears—30" to 96"

Spot & Arc Welders, 6x6" Racine Hacksaw
4, 5, 7, 10, 12, 18, & 30 ton OBI Power Presses
Ammco 7", Shape Rite 8", Shapers
H.S. Vertical Milling Heads
Drill Presses, Foot Presses, Air Hydraulics
Kalamazoo Metal Band Saws
No. 1½ Abrasive Wet Surface Grinder
20 ton Northern Hydraulic Presses
10Z & 20Z Injection Moulders
Fameo 6C Arbor Presses—½ Price—Presses
Sheldon 12" B.G. Shaper

TURRET LATHES

Foster Nos. 4, 5, 6, 1B, 3B, M.D. Univ.
J. & L. 2"x24", 3"x36", W & S #4, 2A

GRINDERS

Surface Grinders, 6x18, 6x24, Abrasive, G. & L.
P. & W. 14", B.B., Vert. Surface 10"x40"
Blanchard 30", M.D.; Modern 12x48" M.D.
Norton Hydraulic 12x18", M.D. Cyl.
Heald No. 72A3 Gagematic
Norton 50"x28' M.D. Roll Grinder
Landis Type A 6x20" Hydraulic, M.D. Cyl.
No. 55, 60, 65 Heald Int., M.D.
12" Heald Rotary, Arter 12" M.D.
B. & S. No. 10, 11, Cyl.: 1, 3 Univ.

LATHES

26x12' Boye & Emmes 3 step cone D.B.G.
14"x6' Hendey Taper, Collets 16"x8'
9" LeBlond, P&W 1"x18" Automatic
36x30' Putnam M.D., 36x22', 42x16
32"x35' Wickes, M.D.
Wade, Hjorth, Hardinge, P & W Precision Bench

AUTOMATICS

Cleveland Model A ⅞", 1¼", 2"; B 1", 2", 3"
Cone 4 spindle, Gridley
Brown & Sharpe #4, 6 Auto., #2 Hand Screw

MISCELLANEOUS

Buffalo 25UD Comb. Punch-Shear
Pexto 3' to 8' Shears & Brakes
Gorton 1A: 375-2 Tool & Cutter Grinders
Wiedman Turret Punch—Type R4P
6" Vertical Shaper, P & W
10x10 Peerless Universal Shaping Saw
#7, 72 Fellows Gear Shapers

HYDRAULIC EQUIPMENT

500 TON LAKE ERIE PRESS

Platen 35"x36", 36" stroke, 68" opening, 150 H.P., 220-440 V. Motor.
600 Ton Baldwin South. Platens 76"x59, Stroke 22", Opening 36".
500 Ton H.P.M. Double Action with 160 ton cushion. Platen 36"x36", Stroke 24", Opening 36".
375 Ton ELMES Double Action, with 60 ton cushion. Platen 84"x44", 12" Stroke, 42" Opening.

350 TON VERSON PRESS

40x40 Platen, 36" stroke, 72" opening. 100 H.P. 3 phase—60 cycle 440 volt.

400 & 500 TON SHAFT STRAIGHTENERS, Self Contained

All Hydraulic equipment is completely engineered and checked by a competent staff, thus assuring reliability. Send us your hydraulic problems.

Deckel G1, G2, G1F Engraving machine
Leland-Gifford 1, 2 & 4 spindles, Model MB
Geo Ohl 8' 16 Gage M.D. Shear, 12' 10 Ga. Brake
Oster No. 316B 6" Pipe Threader, M.D.
Bliss 30" Gang Slitter, 19, 20, 21 OBI Presses

MILLING MACHINES

3B K. & T. Dbl. Overarm
Cleveland Vert. No. 1 M.D.; #1 Univ.
#2B K. & T. Univ.: No. 2, 2A B & S Univ.
No. 3S Cincinnati, S.P.D. rapid trav.
Nos 1½, 2, 5 B & S Plain & Univ.
Hall Planetary Model D Thread Miller
Becker Nos. 3, AB, 5, 6 Vert.
Nos. 2, 3, 4 Cincinnati Vert., S.P.D.
P. & W. No. 12, 1 & 2 spind. Profiler
B & S. No. 1, 3 Vert., Kempsmith No. 1, 2
Taylor-Fenn Spline Miller

RADIALS

Carlton 8' Arm 19" col. M.D., 3½' Mueller
4', 5', 6' American Triple Purpose
Walker-Turner ½" cap., Cinn. Bick. 6'

BORING MILLS

#0 Giddings & Lewis arr. M.D. 3"
2½" Cleveland arr. M.D., 2½", 4" Binsse
Niles-Bement-Pond 4- duplex, 66" Niles
Bullard New Era 24", 42", King 42"

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New York 12, N. Y.
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MBNA

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SPOT DELIVERY

ROLLS—BENDING 20'x1" cap.—1938. Drop End—Pinch Type for full circles 75 H.P. and 35 H.P.—Wt. 74 Ton.

ROLLS, BENDING, Cleveland #2A, 10'x½", Pyramid Type, Drop End, 20 H.P.

IRONWORKER—Pels No. 26 Universal. Punch 1⅜" thru 1". Shear 6x6x¾". Angles. 15 H.P. All steel. Wt. 10½ Ton.

IRONWORKER—Pels #16 Universal. Punch 1-1/16" thru ⅝". Shear 4x4x½ Angles. Squares 1-5/16". Rounds 1½".

PLANER, Cleveland, Openside, 36"x36"x12' Working Table, 2 Heads on rail, 1 side head, Motor, controls.

PLANER—Niles Bemont Pond. Working Bed 48"x48"x26' with 4 Heads. 15 H.P. D.C. 230 volt. Variable Speeds.

RADIAL DRILL—Cincinnati Bickford 7'x15" Round Column. D.C. Drive.

LATHE-ENGINE—Betts-Bridgeford 1942—60" Swing x 30' Centers x 40' Overall. Two Crosslides—Each motor 5 H.P.; 40 H.P. D.C. 230 volt. Like New.

DROP HAMMER—Cecostamp (Chambersburg) 1943. Air operated. Stroke 48". Bed 66"x48"; Capacity 16,000 lbs. Wt. 47 Ton.

SHAPER—Smith & Mills 25"—1945. Used 1 Month—Like New. Universal Table. Swivel Vise.

SQ. SHEAR—10'x⅜" cap. With 15" Gap. 15 H.P. Wt. 20 Ton.

WIRE STRANDERS (1943)
2 Robinson 6"x7 spool, reel, motor. 7½ H.P.
2 Robinson 9"x7 spool, reel, motor 10 H.P.

SAW - NEWTON COLD CUT—Late. 32" diam. Blade. 10" diam. capacity Q. C. Variable Speeds. 2 Motors A.C. Wt. 5 Ton.

AUTOMATIC THREAD GRINDER—J. & L. 1943—Model TG-1245 —Cap. 12"x45"—5 Motors.

POWER PRESSES

	TONS	STROKE	DIE SPACE	TYPE
Perkins #500B	50	3"	20" x27"	O.B.I. b.g.
(2) Bliss #58	20	5"	12½"x13½"	C Frame (1943)
(4) Ferracute C22	20	5½"	13½"x14"	Duplex, 2 Presses on 1 stand (1943) Hopper Feed
Torrington	50	2" & 1"	23" x16"	Sub Arch, Dble. Action, Cam
Toledo #54	60	3"	18" x18"	SS with side shear
Bliss #75½	125	14"	24" x24"	SS Single Action b.g.
Bliss #6	125	2" & 5"	24" x32"	SS Dble or Single Action, b.g. (1942)
Clearing (F1200-42	200	30"	38" x44"	SS Single Action b.g. (1942)
(3) Bliss #78½ (#310)	450	18"	52" x36"	SS Single Action b.g.
Birdsboro	1300	21"	29" x87"	Hydraulic, (1942)
Cecostamp	16,000 lbs		48" 66" x48"	Air Drop Hammer for die stamping (1943)
Bliss #410B Toggle	450	25" & 17"	60" x96"	Toggle, Draw 11½"

MONA MEMBER

KINGS COUNTY MACHINERY EXCHANGE
408 Atlantic Ave., Brooklyn 17, N. Y. Phones: TRiangle 5-5237, 5-5212, 5-5213

ADVERTISED PRICES ON PRACTICALLY NEW MACHINES

(6) CLEVELAND RIGIDTURNERS MODEL No. 616. Original Cost $7,000.00. Excellent Condition. PRICE....$2,000.00 ea.

(1) POTTER & JOHNSTON #5D2 AUTOMATIC CHUCKING MACHINE. Two Spindle, Mfg. in 1942. Excellent Condition. Serial No. 52913. PRICE $4,850.00

(1) NO. 8-D GORTON UNIVERSAL VERTICAL MILLING MACHINE, Serial No. 15634. PRICE.....$1,750.00

(1) 200 Ton HYDRAULIC STRAIGHTENING PRESS. Mfg. by Hydraulic Press Co., Length of Bed 240", Width 24", Clearance Between Rods 30". PRICE $4,500.00

(2) 2-25 TON BLISS DUPLEX PRESSES. PRICE .....$850.00 ea.

(1) NO. 33 EXCELLO THREAD GRINDER. Serial No. 4714, Mfg. in 1943. Excellent Condition. PRICE.....$3,000.00

(1) JONES & LAMSON MODEL NO. TG615 AUTOMATIC THREAD GRINDER. Serial No. 130156. Excellent Condition. PRICE $2,750.00

(1) NO. 75-A HEALD INTERNAL GRINDER. Serial No. 22065. Excellent Condition. PRICE $2,250.00

(2) NO. 72A-5 HEALD INTERNAL GRINDERS. Serial Nos. 13939 and 13940. Excellent Condition. PRICE..$1,500.00 ea.

(2) NO. 74 HEALD INTERNAL GRINDERS. Serial Nos. 24602 and 24603. Excellent Condition. PRICE.....$2,250.00 ea.

(1) LANDIS 18 x 18 EXTERNAL GRINDER. Excellent Condition. PRICE $2,500.00

(4) PRATT & WHITNEY 9" GEAR GRINDERS. PRICE.....$1,000.00 ea.

(4) DETROIT GEAR GRINDERS, Model GG-19. PRICE.....$1,150.00 ea.

(1) TURCHAN FOLLOWER FOR BULLARD BORING MILL. PRICE.....$1,000.00

(1) GLEASON 15" QUENCHING PRESS. Excellent Condition. PRICE.....$1,250.00

(1) GISHOLT NO. 4-R SADDLE TYPE TUR-

(4) #2-G BROWN & SHARPE Automatic Screw Machines. Excellent Condition. PRICE $4,000.00

MONA MEMBER

WINSTON MACHINERY COMPANY, Inc.
517-23 SOUTH DELAWARE STREET, INDIANAPOLIS 4, IND.

Landis 2½" threading machine, lead screw attachment, 1943

Defiance #25A horizontal boring mill, 3¾" bar, 1940

Sidney 18"x11' geared head lathe, swings 21½", taper, 1941

LeBlond 20"x20' centers lathe, 1941

Reid 18"x22" "small piece" lathe, 1943

Heald #49 Borematic, 4 heads, 1943

Liberty 4 head planer 48"x48"x18', 1942

B & S #3A universal miller, fully equipped, 1943

JOHNSON MACHINERY CO.
59 Edison Place, Newark 2, N. J.

MOTOR DRIVEN SURPLUS EQUIPMENT
Automatics, B.&S. #0G, #2, N.B. Grd. 1"—6 Spdl.
Lathe, 16"x6' Sebastian Type R Tool Room
Tool Grinder, Cinn. #2, Blake #2 Tap
Drill, Leland-Gifford #2LMS, 2 Spdl. Hydraulic
Hand Screw, B.&S. #1, Multispeed motor
Oil Extractor, Barrett #402, Tank & Pump
Degreaser, Detrex #VH-400, Electric or Steam
Micro Projector, Wilder, 10X, 50X, & 100X Lenses
OIL BURNER DEVICES, INC.
79 Beacon Street Worcester 8, Mass.

PLANER BARGAIN

One—Niles Time-Saver, all electric Planer, 36"x 36"x120", two rail heads, two side heads, excellent condition. Can be seen in operation. Price $21,000.00, F.O.B. Cars. Available immediately.

THE BAWDEN MACHINE COMPANY LTD.
163 Sterling Road, TORONTO, CANADA

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT – GUARANTEED
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JOSEPH **HYMAN** & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

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NEW and USED—Hand and Power Brakes, Shears, Forming Rolls, Folders, Punches, Rotary Machines, Stakes, Spot and Arc Welders
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361 Atlantic Ave., Boston, Mass.

AVAILABLE FOR IMMEDIATE DELIVERY
(1) HILL-CLARKE (Norton) 10"x72" PLAIN CYLINDRICAL GRINDER AC motor drive—Shipped new in August 1945—Used less than 25 hours—Priced at 50% of acquisition cost. A real buy for quality shops. Wire or call collect
R & H MACHINERY, INC.
84 Prescott St., Worcester 5, Massachusetts

For more than 80 years

THE NAME "HILL-CLARKE MACHINERY" HAS MEANT THE BEST BUYS IN MACHINE TOOLS . . . . . .

AUTOMATICS

No. 2 Brown and Sharpe
1⅜" Greenlee, 6 Spdls (1941)
No. 61 New Britain 6 spindle 2¼"
No. 6 Brown & Sharpe

DRILLS

No. D-8 Colburn No. 6 Morse Taper
No. 150 Baker Mfg.
No. 1LMS 20"—6 Spdl. L.G.
No. 2LMS—26"—4 Spdl. L.G. (1942)
No. 2MA6—15"—4 Spdl. Avey
No. 3B—24"—6 Spdl. Edlund (1942)
No. 2—8 Spdl. Leland-Gifford
No. 4 BL Natco 36 Spdls.
7'-15" Col. American Full Universal

GEAR MACHINES

No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 18-H Gould & Eberhardt
11" Gleason Bevel Gear Cutter
72" Cincinnati Gear Cutter
No. 13 Gleason Univ. Tester (1942)

HOR. BOR. MILLS

No. 26 Defiance, 4½" bar (1943)
No. 31 Lucas, 3" bar
No. 3A Universal, 3" bar
Rockford, 3⅛" bar

GRINDERS

4"x12" Landis, Model H (1942)
4"x18" Landis Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"x18" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
Norton Motor Driven Plain Grinders
6"x18" —— to —— 24"x240"

12"x36" Landis Type LCH Universal (1945)

No. 5—8"x24" Covel Hydr. Surf. (1941)
24"x24"x84" Mattison Hydr. Surf.
No. 34 Abrasive Surface (1943)
No. 22—12" Heald Rotary Surface
No. 25A—24" Heald Rotary Surface (1943)

72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)
74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Gdr. (1942)
No. 16-38 Bryant Internal Grinder (1942)
No. 24-26 Bryant Internal Grinder (1942)

10"x72" Colonial Broach Grinder

LATHES

14"x6' Hendey, Yoke Head
15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
18"x6' American, Grd. Head
22"x48" centers Monarch (1942)
36"x30' Lodge & Shipley
36'—48"x16' Lehman Hydrotrol (1945)
48"x20' centers Simmons (1942)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x22" Sundstrand, Model AA (1943)
12"x18" Lipe Carbo (1942)
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 4 Cincinnati Plain (1943)
No. 08 Cincinnati Vert. (1942)
No. 2H Milwaukee Vert. (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati Vert. High Power
24" Cincinnati Production
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand Electromil (1942)
No. M-18 Milwaukee Simplex (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cinn. Hyd. Tracer (1942)
No. 45-48 Cinn. Hyd. Plain Tracer (1942)
No. 56-90 Cinn. Hydromatic (1943)
No. 2 Hanson-Whitney Thread
4"x9" Hanson-Whitney Univ. Thrd. Miller
4½"x12" Pratt & Whitney, Model C
6"x20" Pratt & Whitney, Model C
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
6"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread Miller (1942)
4" Taylor & Fenn Spline, M.D.
24"x24"x12' Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
72"x6' Ingersoll Face Miller (1941)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-705 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
No. 22-C Racine Shear Cut Hack Saw
8-M Wells Band Saw
No. 20 Bliss O.B.I. press
No. 2 V & O open back press
No. 0 Bakewell Tapper
Baush Radial Tapper (1942)

PLANERS

36" x 36" x 12' Cincinnati
36" x 36" x 18' Gray, 4 Heads
48" x 36" x 14' Gray
48" x 48" x 12' Cincinnati, 4 Heads

TURRET LATHES

No. 2 B. & S. Screw Machine, Wire Feed
No. 3 Bardons & Oliver (1942)
No. 5 Warner & Swaseys (1942)
No. 5 Bardons & Olivers (1942)
No. 5 Foster, A.C. & Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼ Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

VERT. BOR. MILLS

34" King
36" Rogers, side hd. (1942)
72" Cincinnati
72" Niles Extra Heavy
84" Betts

HILL-CLARKE MACHINERY CO.
651 WASHINGTON BLVD.
Chicago 6, Ill.

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Trying to get top production out of old machines. Let NOLL'S rebuilt and guaranteed machines do your job.

LATHES & TURRET LATHES

1L Gisholt (Chucker)
No. 5 Gisholt (Chucker)
No. 4 Gisholt (Chucker)
16x54 Bradford Lathe
16x36 Reed Prentice
36" Rogers
84"x24' New Haven (Older)
36"x24' Fiefield (Older)

GRINDERS

Norton, type C, 10x36 Ang.
Rivett, No. 104 Universal
Landis, 16x36 Universal
Landis, 6x18 Plain Hyd.
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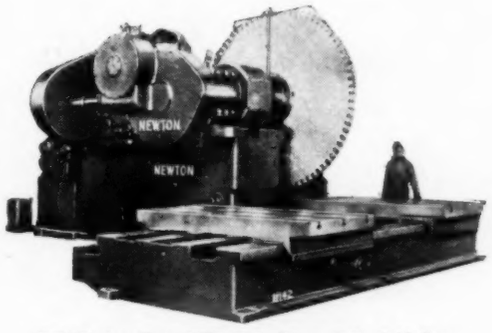

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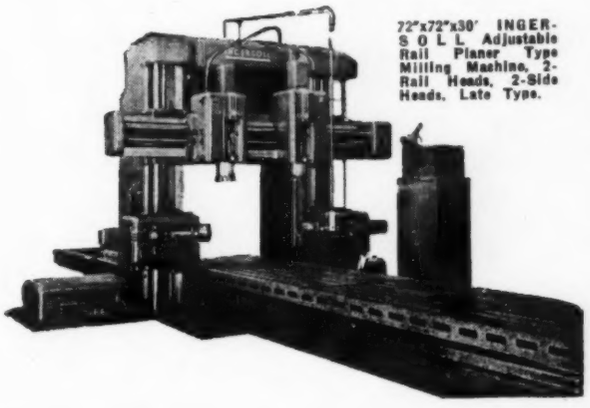

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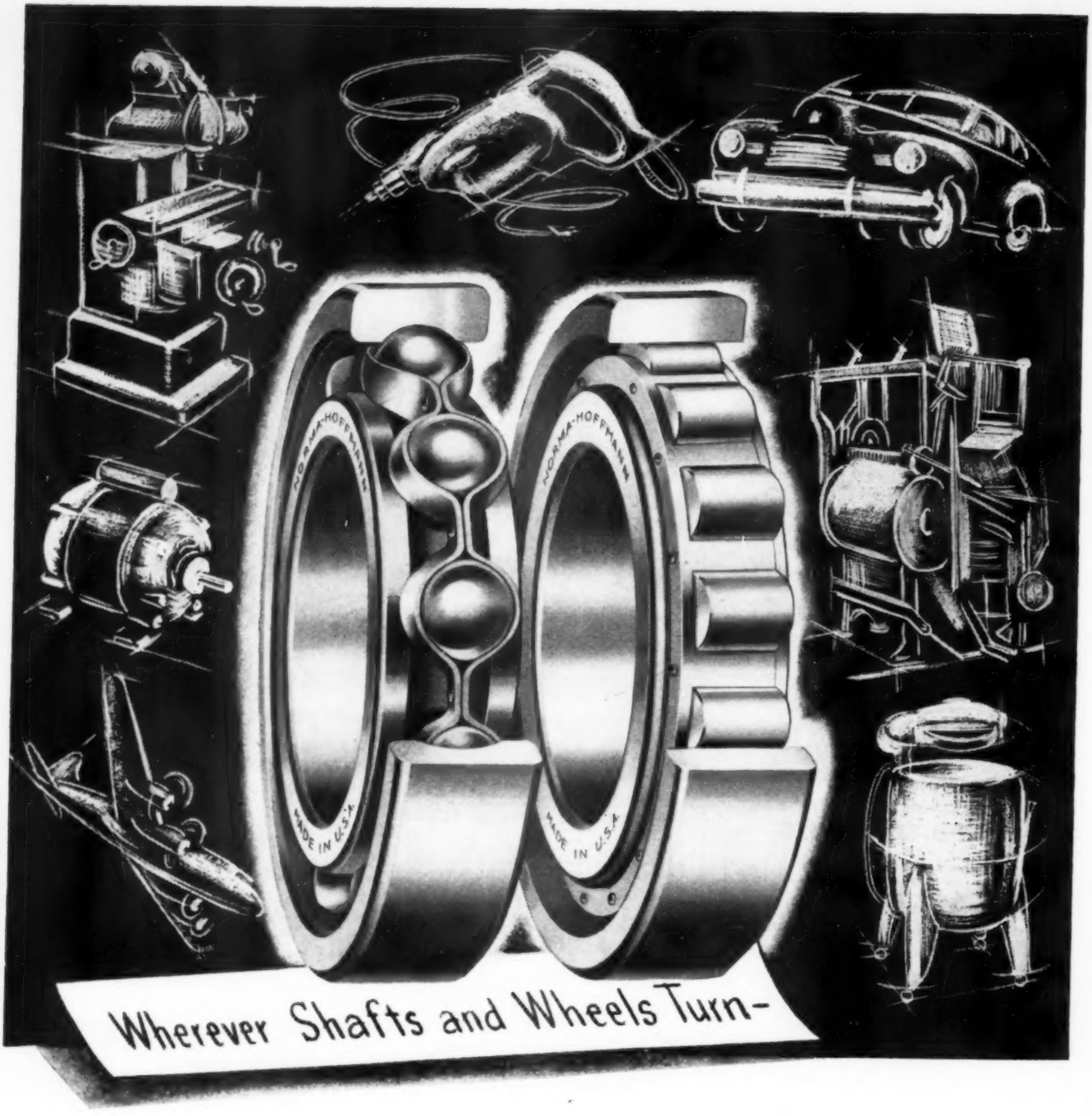

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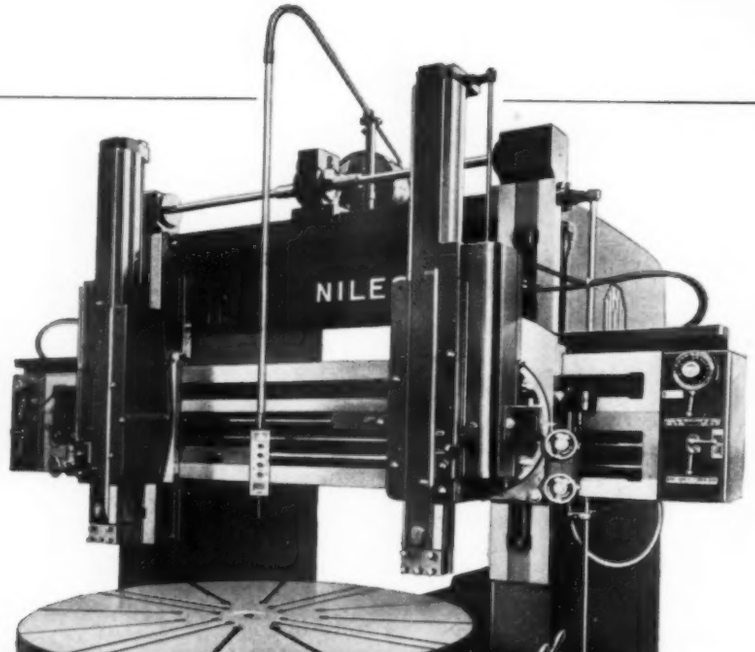

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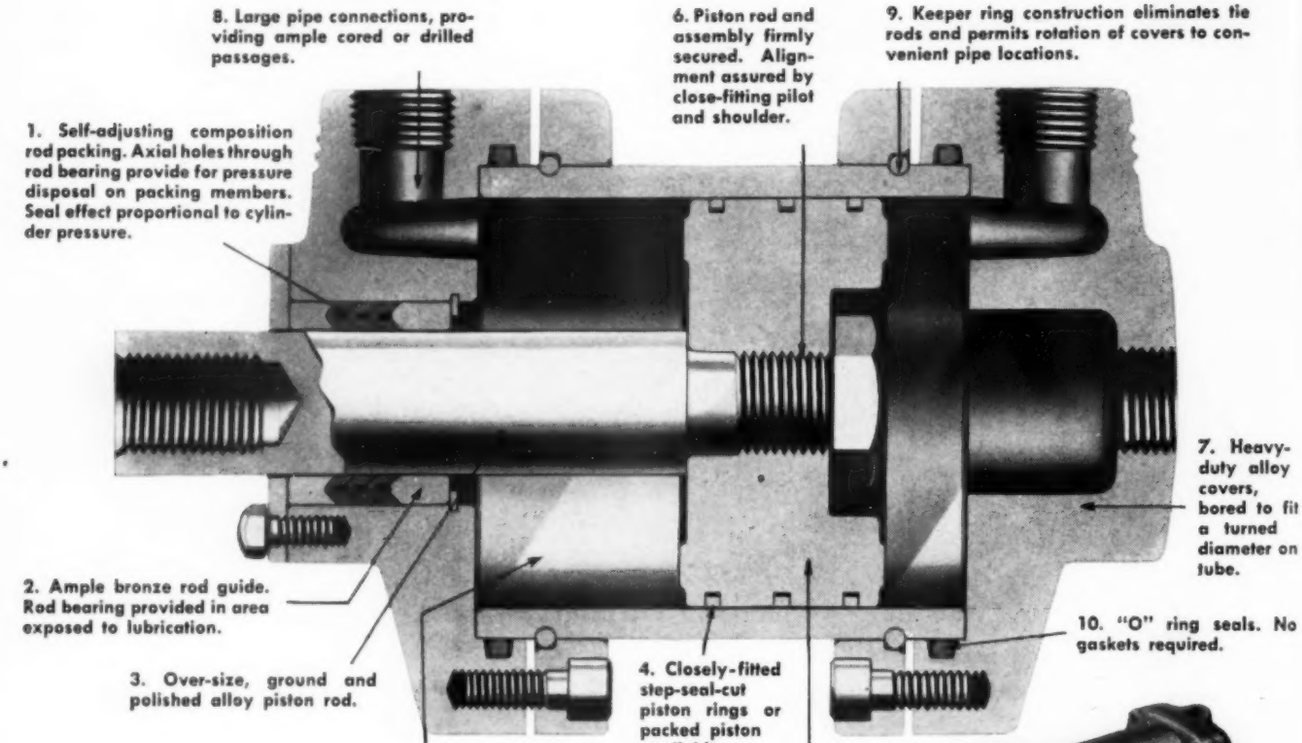
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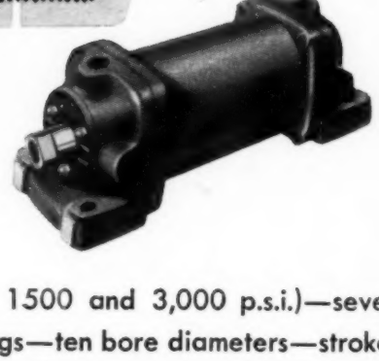

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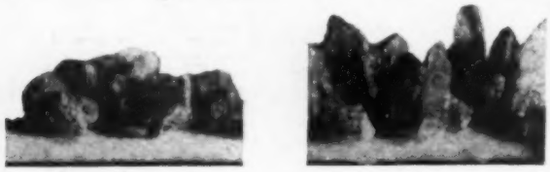
AMER MACH—26441—Oct 7

The Backstand-Belt Method of Production Grinding, Polishing and Finishing offers

NOT 1 BUT 5 ADVANTAGES!

The coated abrasive belt used in conjunction with contact wheel and backstand idler has been established as an efficient production tool. For grinding, polishing and finishing hundreds of consumer and industrial items, the backstand-belt method is more efficient and economical than the older set-up wheel method—because the backstand-belt has these five advantages over the set-up wheel . . .



a b

1. An abrasive belt is a scientifically made tool, manufactured under controlled atmospheric conditions by experts utilizing modern making equipment. The photomicrographs compare the crude, uncontrollable rolled-on cutting surface of (A) a typical set-up wheel with (B) the coating on an Armour Abrasive Belt. Note how the sharp cutting points on the factory coated belt are exposed to provide faster, cleaner cutting action . . . increased production.
2. The coated abrasive belt cuts cooler because of the longer interval between work contacts.
3. Inexperienced help can be quickly trained to operate a backstand-belt machine. Highly skilled personnel needed to dress the wheels can be used elsewhere.
4. It takes only a few seconds to change an abrasive belt.
5. Temperature-controlled room for curing set-up wheels can be released for other more productive uses.

Actually, there are more than five advantages to the backstand-belt method. If you are now using set-up wheels for your grinding, polishing and finishing operations, it will pay you to investigate this modern method. The coupon below is for your convenience in requesting the additional information contained in our new booklet—"Facts about Backstand-Belt Grinding and Polishing."

MAIL THIS COUPON TODAY

Please send me the booklet.
"Facts about Backstand-Belt Grinding and Polishing"

*Name*_____ *Title*_____

*Firm*_____

*Address*_____

*City*_____ *Zone*____ *State*_____

Typical example—polishing and deburring time on stamped out surfaces improved 40%.

The McCaskey Register Company of Alliance, Ohio, a leading manufacturer of bookkeeping equipment, formerly used set-up wheels for polishing and deburring stamped out register covers. By switching to the backstand-belt method, production time for this operation was cut from one hour and 15 minutes per unit to 45 minutes per unit.

CASE HISTORY

This is a splendid example of what the backstand-belt method can do for you regardless of whether you are grinding, polishing or finishing flat or contoured surfaces, cast stamped or forged pieces.

PART. Cash register cases with fitted top cover.

MATERIAL. 18 gauge steel on cases, 20 gauge steel on covers. Both are deep draw stampings. They are given 3 draws and 2 anneals before polishing. The anneal is scale free as a result of being treated in a special atmospheric furnace.

PROBLEM. Polish flat surfaces after stamping and annealing. Debur fins resulting from stamped out portions of cases and covers.

PREVIOUS METHOD. Set-up wheels—grits 36, 60 and 100. Production with this method was 1 hour and 15 minutes for one case and cover.

SOLUTION. A Porter-Cable backstand unit is used in conjunction with a 16″ medium hard, segmented felt contact wheel. The abrasive belts used are a No. 50 Armourclad Heavy Duty Alundum Cloth 2″ wide x 168″ long and No. 100 Armourclad Alundum Cloth 2″ wide x 168″ long running at the rate of 7000 SFPM.

RESULTS. It now takes only 45 minutes to polish and debur one case and cover. Intermediate sanding operation eliminated. Storage problem greatly decreased.

We recommend buying through your Industrial Distributor.

ARMOUR *Coated Abrasives*

ARMOUR AND COMPANY

1355 W. 31ST STREET • CHICAGO 9, ILLINOIS